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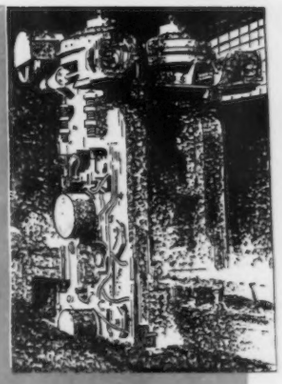
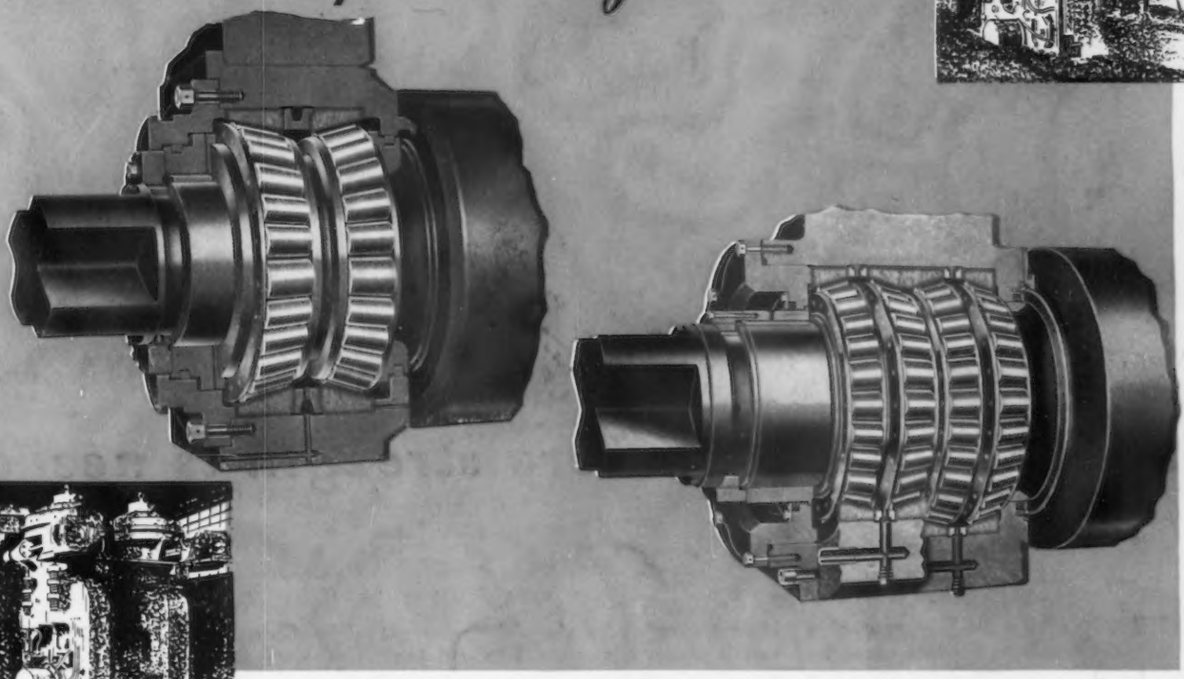
NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY FEB 9 19 CONTENTS INDEX PAGE 9

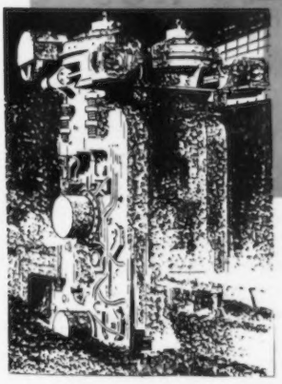
THE IRON AGE

DUCTION -:- MANAGEMENT FEBRUARY 8, 1934 PROCESSES -:- NEWS

The Difference Between
HIGH COST *and* **LOW COST**
in Rolling Mill Operation







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▲▲▲ THE IRON AGE ▲▲▲

FEBRUARY 8, 1934

ESTABLISHED 1855 Vol. 133, No. 6

The Silver Lining Has Its Cloud

THE fact that the recent billion dollar issue of Treasury notes and certificates was oversubscribed in the amount of 3½ billions "delighted Secretary Morgenthau, encouraged Wall Street and enabled banks and bond houses to do a rushing business."

After conforming to the customary proprieties by remarking that this accomplishment demonstrates the moneyed public's confidence in our Government, we add that it as emphatically shows its lack of confidence in private business and industry.

The fact that 3½ billions of dollars applied for temporary work at the low wages of 2½ and 1½ per cent would indicate that unemployed money felt unable to find a permanent job elsewhere at better wages and safety.

With banks crammed with idle money and credit and with much of the two billions which fled this country during the past year now returning with their profits to add to the plethora, there should be no trouble in "floating" almost any short-term issue of Government tax exempts.

How much better it would be for the capital goods industries if savings and credit were so busily and profitably employed in private activity that Uncle Sam would have to do some real persuading to enlist a gigantic army of dollars! As it is, our dollars are not doing their duty by American industry either on the short term or the long term basis.

Foreign buying is now currently supporting most of the activity of some of our important capital goods industries. The last report of the National Machine Tool Builders' Association, for example, shows that more than one-half of the total current business being booked by this industry is for foreign delivery. Of this foreign demand, a minor part only is from Russia.

Stop and think, for a moment, what this means. It means first that private capital abroad, unlike that here, is going into private enterprise abroad on a long term basis. It means too, that our foreign competitors for world trade are alive to the vital necessity of replacing obsolete equipment so that they can manufacture more cheaply and thus better contend with our depreciated dollars. These nations are buying here only that part of their equipment which they cannot make themselves, *yet they are taking over half of all of the machine tools that we are producing.* When you see your competitor across the street or across the sea putting in the finest tools that the world can supply—and lots of them—it means trouble ahead for you if you remain content to operate on obsolescent standards.

THIS record is a grave indictment of American judgment and foresight at a time when we need all and more than our tool building industry can produce to put our plants not only in competitive position for world trade but also in position to make the necessary cost savings which alone can pay our bill for recovery.

It is an even more serious indictment of the obstacles which stand in the way of the return of our private capital to its normal employment in private industry.

J. H. Van Deventer

Supervision and Standardization

SUCCESSFUL foundry supervision is in many respects an art. There is much connected with this very interesting work that is unknown to those not actually engaged in it. It is different in some respects from other kinds of supervision and demands a type of character and temperament that can lend itself to various conditions and situations. Some are more successful than others in the supervising work because they have found the pleasure there is in it.

It is a case where work is really a pleasure. Each day new problems confront us. They may not be new to us but may represent something very mysterious to others, and it is always a pleasure to be qualified to enlighten some one about something we know about from actual experience. Then comes the question of untangling some complicated controversy among the men that taxes our talents also and takes the monotony out of life. We know there are always little troubles and misunderstandings in the foundry; in fact, we believe the foundry that does not have them does not have any production to boast about.

It is also interesting to straighten out cases where some one person or even several persons are trying to put over something that they know is not right and think that the boss cannot see through the scheme. So I believe it can truthfully be said that a great deal of satisfaction can be found in foundry supervision. The main thing is to know how to do things and to study human nature. I believe that a practical man, if progressively inclined, should be more successful than one without practical experience.

Opportunities the Practical Man Overlooks

By practical experience we refer to men who have made molds with their own hands, who have made castings and found them in the scrap heap, who have learned the cause by bitter experience, who have made cores and had them blow and scab or fall to pieces when handled, who have operated a cupola and have it bung up in the middle of the heat or cut through the bottom doors, who have made patterns that work a decided hardship on the molder. Such men through many successes and failures become experts in molding, core making, pattern making, melting and sand mixing and should be better qualified to keep pace with the rapid strides of foundry progress than anyone else, providing they are progressive.

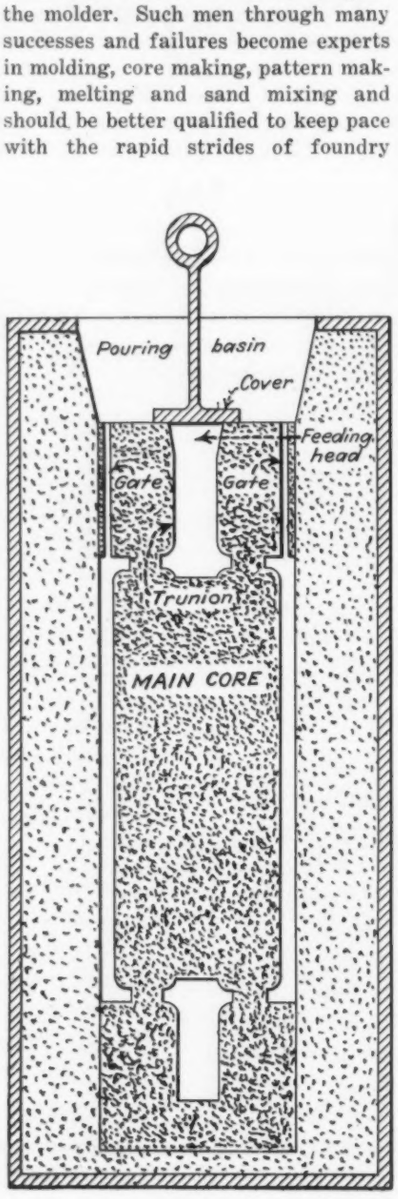


Fig. 1—The standard molding practice for textile roll with solid trunnions on each end provides for 18 gates of ⅜ in. diameter for rolls of 12, 14, 16 and 18 in. diameter. The cover over the feeding head is removed as soon as the mold has been filled with metal.

The more complicated the castings, the greater need there is for practical experience, and it should require very little effort on the practical man's part to keep up with or to lead the way to greater achievements in the foundry. Unfortunately a few men with all of this ability are not inclined to lay aside the hat their fathers wore but are content to stand aside and watch others with much less experience do things that they could do a great deal better if they would only apply their knowledge to the new ideas. However, this is not true with all practical foundrymen, but the point we wish to emphasize is that if practical men would take their proper place in the foundry parade they should be at the head of the line, leading on, instead of being content to take second place as an adviser to someone who struggled through with only a smattering of what it is all about.

Standardizing Practice is the Need

Today standardizing practice as far as possible is what we need. We should have the safest and most economical methods, and standard practice can only be created from practical experience. Whether it is passed on to another or established by the practical man himself, the latter is best and cheapest because no special course of study or experimenting is necessary (experiments are instructive but often very costly). It is possible to establish some kind of standard practice in any class of work. The value of a standard practice in the jobbing foundry is its influence upon the quality of the work.

Competent molders have different ideas about the best way to do the work and naturally some are better than others. The standardization method in such cases is to pick out the best way and make it a standard for all men to work by. A few examples of how this work is handled in a jobbing foundry are shown in the

In the Foundry ▲ ▲ ▲

By PAUL R. RAMP

FROM a wealth of foundry experience the author makes a strong case for the practical man as the supervisor of the foundry. Provided he is a student of human nature as well as of foundry technique, which is true of those showing any progressive traits, the foundry will be signally successful in respect to quality of output and minimum foundry losses. What is stressed as an outstanding need in foundry procedure is a recording of practices so that eventually standards are established for the control of every class of product handled by the foundry.

following sketches. These standards refer only to the gating, feeding and the grade of metal to be used.

Examples of Standard Practice

Fig. 1 is a cross section of a textile roll mold.—The casting was molded many different ways with very poor results. The loss often was 50 per cent or over. The main trouble was the method of gating and feeding. The scheme shown reduced the loss to less than 1 per cent, and consequently was adopted as a standard.

Fig. 2 is a cross section of an acid kettle job.—Considerable trouble was experienced on account of soggy metal at the point indicated by the letter *A*. It was found that a chill used at this point corrected the trouble and gates, located as shown, worked out well for the size of kettles indicated.

Fig. 3 covers an old method of gating and feeding castings of the character shown, but it was found to be most effective where clean and solid piston heads were required and was adopted as a standard for all similar castings.

Fig. 4 shows a cross section of a Diesel engine piston head. These castings are very important and must be free from sand holes and other defects. The standard in this case was adopted to control the location, number and size of the gates.

Fig. 5 is a cross section of mold and standard for an air compressor liner to be used in connection with the Diesel engine. It was not unusual for the foundry to cast eight of these liners in order to secure one that would be accepted by the machine shop. The method of chilling the casting at *AA* was found to be very beneficial. The feeding head was also sufficient to take care of the shrinkage, and metal mixture No. 1 was a standard mixture for this work.

Fig. 6 is another standard for gating Diesel engine liners to control the number, size for gates, molding method, etc.

This plan of standardizing work in a jobbing foundry is very simple and each week a new standard can be worked out and adopted until almost the entire field is covered. It can be readily seen how much can be accomplished in the way of improving the quality of the casting, and securing the value of a practical man's knowledge in the work. There are few practical foundry supervisors that do not know all about the best methods for doing work, and if they would only put them in a shape so that they could be recorded, the practice would be of lasting value to the foundry trade.

A practical supervisor at the head of a foundry is responsible for the results in all departments. If the castings the shop is turning out are not up to the standard, it is his fault. He has no alibis. He cannot blame the metal, the sand, the pattern or the molder, because he is the master molder, pattern maker and sand mixer and must make right what is wrong as quickly as he can before excessive

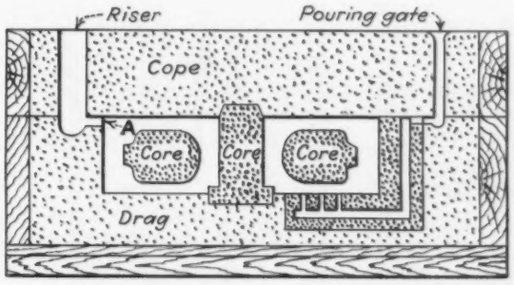


Fig. 3—An old method (above) of gating and feeding steam piston castings was adopted as standard for all castings of the general class. The inlet gates enter directly under the lightener core. The bottom of the channel leading from mold to riser must be at least ½ in. above the point where the groove for piston ring is cut. All cores are of oil sand and the bottom gate is made in a core.

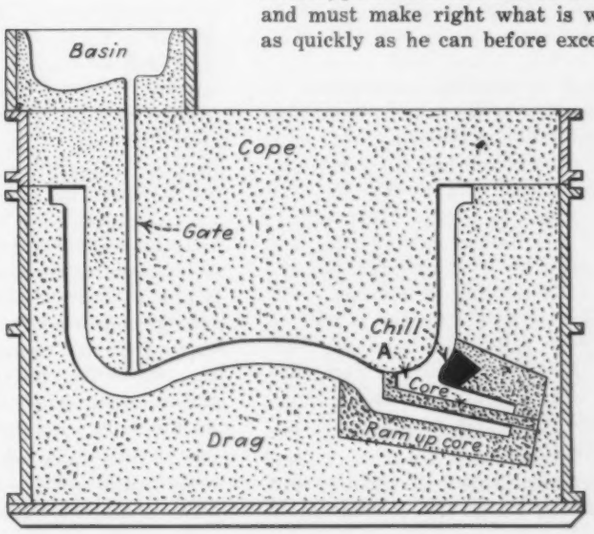
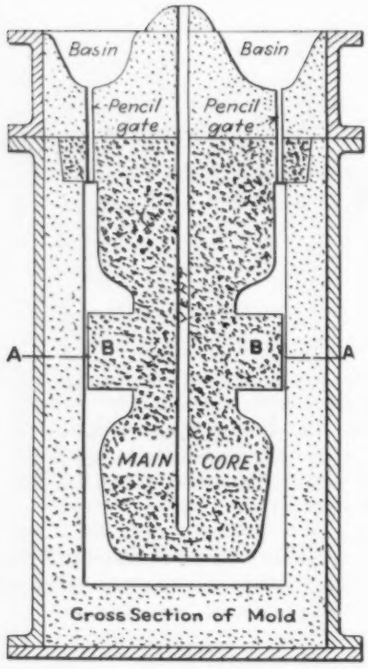
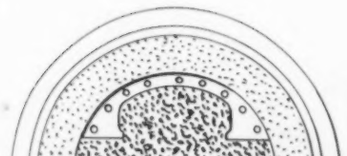


Fig. 2—The standard molding practice (at right) for acid kettles emphasizes the use of a chill to prevent so-called soggy metal, the chill being a part of the ram-up core. For kettles of 30 and 36 in. diameter, four 4-in. diameter risers are called for and for 40 and 48-in. kettles, four 4½-in. risers are required; two gates, 1¼ in. in diameter are recommended in all cases.





Section A-A

Fig. 4—The standard adopted for a Diesel engine piston head provides for introducing the metal so that it will not fall on the wrist-pin cores, B,B. For pistons of 10 to 18 in. diameter, inclusive, 18 gates of ⅜-in. diameter are required.

loss is suffered. If he fails to do this, it is not an indication that he does not know how to prevent these failures but probably because he is not following the job as closely as he should be.

Supervisor Often Given Too Much Help

Real foundrymen do not need as much help to manage the foundry as is the general opinion. The idea of relieving him of many details so he will be free to supervise only can be overdone, and instead of helping him it only makes him lazy. I do not expect him to be timekeeper or keep the production records, etc., but all of this work should be under his supervision, including many other details.

Workmen's mental attitude toward their employer is of vast importance. They need not love him but they must have respect for his ability before he will be able to get the best that is in them.

I know a practical man who is in charge of a large foundry plant as manager. He has a wonderful organization of foremen and workers, who all respect him because they know he is competent to judge their efforts and to pick the good from the bad. They never try to deceive him but are continually striving to improve methods, because they know he is able to appreciate fully the value of their work. As a result he has numerous minds working on his problems daily; and with such help no one could fail to succeed.

A practical supervisor can reduce bad casting losses and prevent their recurrence better than one without practical experience, because he is able to teach his men how to overcome their troubles if they are at fault, or to make the necessary changes in his metal, sand mixtures, etc.; and best of all his workmen do not question his wisdom regarding what he teaches them. Neither do they resent it. He talks their language; consequently, he gets closer to them than some one who has not pounded sand himself.

The same thing applies to production. It is much easier for him to induce a workman to do the proper day's work because the workman knows he cannot be fooled. He can go over the work in detail with him and demand what is right for the man and for the company.

Costly Experiences with Non-Practical Men

Men very quickly discover the fact that their superior is not a practical man, and sometimes all of his lieutenants, from the foreman down, proceed to take advantage of him wherever they can. I have in mind one foundry superintendent who, while not a practical man, insisted upon work being done a certain way, because he was advised by another about as practical as he, or read an account of how it was done but did not thoroughly understand it. His foreman, knowing he was wrong, did, nevertheless, follow his instructions without protest with disastrous results and the company paid the bill.

It is true there are men who have never made molds with their own hands who are successful in managing foundries. It is also true that in most cases they have loyal lieutenants who work with them and advise them on many details, and, with their managerial ability and loyalty, help them to become successful. Of course, in time they learn the practical side of the business at the expense of the company they are working for.

If it were not for the daily changes in the casting requirements, it would not always be necessary to have a practical man in charge, as the work would in time become more or less a habit.

Much money is sometimes wasted by impractical men insisting upon doing things that are not practical, especially in starting new work through the shop. They resort to numerous experiments that cost money. It might be said that some supervisors without practical experience are fair-weather foundrymen. It is easy for them to be deceived or carried away by suggestions from others. I have in mind a man without practical experience who insisted up-

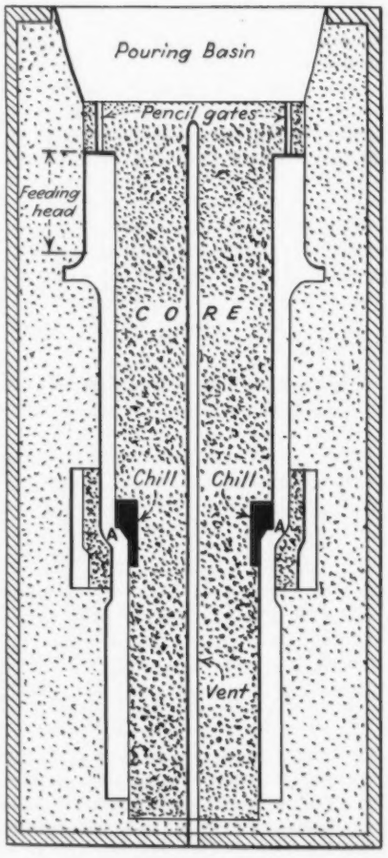


Fig. 5—For casting cylinder liners, the standard practice requires molding in dry sand, casting on end, pouring with hot metal and chilling at the points A,A. The length of the feeding head is 9 in. for the 10-in. liner, and 10 in. for liners up to and including 20 in. diameter. The gates are ⅜ in. in diameter and 20 in number.

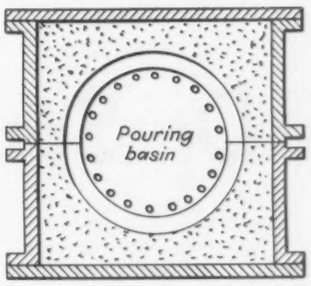
on his foreman experimenting with all kinds of gates and risers in an effort to produce a small head for a refrigerator out of an iron mixture of 80 per cent steel scrap, 10 per cent pig iron and 10 per cent old brake shoes. The result was numerous defective castings, which were charged to the method of molding and gating, and no relief was felt until the percentage of steel was reduced and the old brake shoes eliminated. Then it was found that almost any of the molding methods tried would produce a perfect casting.

The practical man in charge of all operations would not have suffered this loss. He would have used the metal suited for the casting in the beginning. Men who have practical experience in molding, core making, melting and pattern making seldom need to waste any unnecessary time and money to determine the cause for failures or the possibility of reducing costs. They can decide these questions generally without a dozen expensive conferences of all concerned.

Training of apprentices is another thing the practical foundryman is best qualified to do. He has the knowledge of all the little details connected with making castings. All he must do is to study how to teach. It is true supervisors are not all teachers, but they can learn how to teach much easier than the impractical man can learn how to mold. They know what they want to teach and all they need to know is the best way to put it over. A great deal more can be taught by practical demonstration and no one can make a demonstration and point out each detail as easily as he who has worked at the trade with his own hands.

We have often heard foremen complain that the apprentice boys the instructor was turning out were of no value to him, but at the same time he never did a thing to help them. This man is what we would call a non-progressive practical man; and it is such men that have created the impression that a practical foundryman has his limitations and cannot go far toward greater and bigger things. This is a mistake. There are numerous practical foundrymen today who are progressive and responsible for 90 per cent of the improvement in foundry practice and are leaders in standard methods.

A friend of mine who has been in the foundry for fifty years is one of the most progressive men in his line. Years ago he made a careful study of sand and sand control and perfected a method of testing sand that is equal to any now in use. It was his practical knowledge that enabled him to do this. He could feel a handful of sand and decide whether or not it was good, but he wanted a standard that anyone could use. Such men are the men that are making the foundry business in this country better every day.



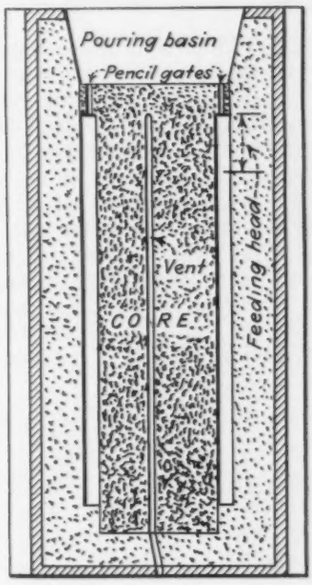


Fig. 6—For large liners and bushings, dry sand molds, casting on end and the use of very hot metal are items of the standard practice. Gates are ⅜ in. in diameter; 20 of them suffice for sizes up to and including 24 in. and 22 for diameters as large as 40 in.; the feeding head is 8 in. for a 20-in. bushing, and 10 in. for larger diameters.

▼ ▼ ▼

Foolish Foundry Failures

Many foolish foundry failures occur in the foundry where the company is paying the supervisor while he is learning the business. A few examples of guessing may be mentioned.

First, in an effort to mold retorts 14 x 4½ x 96 in., wide surface up, the plan called for six chaplets in the cope and six in the drag to hold the core. Great care was required to secure uniform thickness on both sides of the core, but the result was crooked and cracked castings and the high cost of molding. The proper way to mold the castings of this character is on end or edgewise, so no chaplets are necessary. When molded on edge, the lifting pressure under the core was reduced and the core lying edgewise in the mold was rigid enough to withstand the lifting pressure without the aid of chaplets. The result was two castings per mold, seven molds per day against one casting per mold and four molds per day.

Another was an attempt to mold a large kettle bottom up because the bottoms were 3½ in. thick and the side walls only 1¾ in. thick. It was considered necessary to mold the heavy section up so it could be properly fed. The result was the kettle failed in service; and the reason it failed was because where the best metal was needed the least pressure was exerted when it was cast and the liquid metal did not lie quietly on the surface of the mold that formed the bottom of the kettle.

The method used to mold these kettles in everyday foundry practice is bottom down. The 1¾ in. wall of kettle is sufficient to feed the heavy bottom, and the increased metal pressure on the bottom part of the mold when the kettle is cast bottom down insures sound metal in the casting at this point.

There are numerous cases of this kind that occur daily, and it is sometimes surprising how few castings are lost rather than how many. The writer is not attempting to belittle any man's efforts who has not made molds with his own hands, but is trying to make the practical foundryman realize that if he is not at the head of all progressive movements in the foundry today it is his own fault.

The *Proceedings* of the American Society for Testing Materials for 1933 are available in two volumes. Part I, of 1092 pages, covers committee reports, including the specification writing of the year with its establishment of tentative standards, and Part II, of 804 pages, contains all the technical papers presented at the 1933 annual meeting. A notable feature of Part I is some 50 pages of data on the physical properties of cast iron, probably the most comprehensive ever assembled in this country. Also of significance are data on corrosion and discussions of short-time high-temperature tension tests. Each volume is obtainable, at $5.50 in heavy paper binding, $6 in cloth and $7 in half leather, from the headquarters of the society, 260 South Broad Street, Philadelphia.

Dr. Sprague Discusses

RECOVERY efforts, by and large, says Dr. Sprague, noted monetary expert and at one time Administration advisor, "should be directed toward creating a situation in which something or other can be produced at a profit in larger quantities than in the past." Price rises which come about through such activities are beneficial, he believes, but he does not regard the artificially boosted price level as a panacea for prosperity.

IT is the prime business of industry to foresee or to discover the kinds of things that people want in enlarged quantities if they were offered at slightly lower prices, and then discover the methods and means of producing these things at the lower prices and at a profit. This is a key to improved business according to Prof. O. M. W. Sprague, Harvard University, who recently addressed a joint meeting of the Illinois Manufacturers' Association and the Illinois Manufacturers' Costs Association.

Prof. Sprague pointed out that we have now reached a stage in trade recovery when it is most important that the policies of our Government be subjected to searching and critical examination. Last spring the situation was so critical and dangerous that a critical attitude was inappropriate. We needed to move, to go, to be on our way, in the words of President Roosevelt. But we have now gone far enough upon our way properly to inquire whither we are going.

We all seek a situation in which there shall be full employment of labor, active business, believing that in such circumstances prices would rise, somewhat lightening the existing burden of debt.

There is general agreement as regards the new deal, when expressed in very general terms. We could all wish that economic conditions be more stable than they have been in the past and also that there be a somewhat more equitable division of the product of labor and capital, and that some of the very disconcerting acts that have characterized some people in important positions should no longer afflict the community.

When, however, we examine the situation in more detail, differences of opinion begin to merge, and yet we find ourselves in the situation in which there is almost no vocal criticism and examination of what is being done. Certainly there is no party criticism. Only here and there is an individual voice raised in Congress in critical examination of any one or another of the various policies of the Government, and the same is true outside of Congress with the public at large.

In going forward towards a trade recovery we have relied far more than in the past upon governmental action. In Washington there is a very considerable number of people who honestly believe that it is desirable that there should continue to be indefinitely a very, very large measure of governmental control over all of our industrial or economic activities.

They do not believe that it is possible to secure the general objectives of the new deal by anything approaching a return to our old traditional, individualistic system. They desire, for example, that industry generally be organized in each line of production with a few producing units, because then they believe that it will be far easier to exert governmental control.

Trend Toward Quasi-Monopolies

This seems to be one of the serious problems presented by NRA. The Government seems to be favorable to the organization of each and every industry on a quasi-monopolistic basis, conducted more or less by trade associations under the supervision and control of the Government; and at least a very considerable number of industrialists, especially in industries that are already organized on a large scale, have fallen for this form of organization. They have looked with favor upon anything that would rid them of the anti-trust law, enable them to make arrangements among themselves as regards production, as regards prices and all the rest of it, including even the introduction of new machinery or the establishment of additional plants, forgetting apparently that such power lodged in private hands is almost certain to be speedily followed by the adoption of strict governmental control.

Our organization of government is not well suited for the concentration of power in Washington which seems to be taking place. There is an immense difference in power and prestige between the president of the United States and anyone else in Washington. The president has no colleagues in the sense, for example, that the prime ministers of various countries have colleagues. More and more the organization of Congress is such that it is in large measure ineffective as a measure of control. Our system of divided powers was satisfactory in the old days when the functions of the national government were comparatively few and simple. Our organization is not suited to a situation in which such extraordinary powers and controls are being concentrated in Washington as is the present tendency.

When Government Spending Stops

Consider the question of huge Government expenditures for relief, public works, etc. We may assume that however it is expended it will have a stimulating effect upon business, especially on those lines of industry producing consumer goods. It creates a situation analogous to that which obtains in time of war. In the case of a great war Government expenditures enormously increase. The Government makes a huge demand for labor and an active use of a great deal of manufacturing plant of the country, and prices go up in those circumstances. And it is not impossible that prices will go up under the impact of the huge and greatly increased Government expenditures of the months just ahead. It is quite certain, because there is such a great amount of slack to be taken up in unemployed labor and in excess plant capacity. Still, a moderate improvement in prices would seem to be reasonably probable as a result of Government expenditure in the next few months.

But there is another aspect of the matter, one in which also the war comparison is probably helpful. When we are engaged in a great war we all know that when the war comes to an end the expenditures will taper off very rapidly, and that we will then be in for a period of painful readjustment, and we recognize that as one of the inevitable burdens or costs of being engaged in a war. We do not

Price Levels ▲ ▲ ▲

regard the prosperity as resting upon a permanent foundation. We perfectly well know that it will end with the Armistice or Treaty of Peace.

What, however, is the situation as regards analogously large governmental expenditures in a period of depression? What will happen when and if the expenditures cease? Are we then to be in for a period of painful readjustment analogous to that which follows a war? This should be answered in the affirmative, unless the governmental expenditures are so handled that they will gradually taper off from the absorption of the men employed by the Government into private industry.

Intrigued by the Price Index

Washington has been intrigued by that wretched device of the statistician, the index of wholesale commodity prices. It is so eager to get prices up that it does not seem to inquire very particularly what prices go up. Does it make any difference whether the price index goes up because of an increase in the price of hogs or an increase in the price of agricultural machinery?

In order to get a permanent trade recovery we must obviously produce with full employment a much greater quantity of goods and services than are now being produced and consumed, and the problem is to know what sorts of things would find a market if produced in much larger quantities, and whether it is possible to produce those things at prices which will permit their consumption and at the same time prove profitable to those engaged in producing them.

That was a sort of a development we witnessed in this country in previous decades in the case of important industries of which perhaps the automobile is the most striking instance. Between 1910 and 1928 there was an enormous increase in the output of automobiles, and the industry was reasonably profitable, with, of course, a certain amount of mortality as one would expect in a new industry. But how did the automobile producers tap this potential demand for more cars? By somehow or other finding it possible to place upon the market lower priced cars, and that tapped a potential demand.

Choking Off Future Employment

Public works, relief work and civil relief expenditures are largely in the direction of producing something which is analogous to construction work in home building for the mass of people, but the policies that have been adopted are calculated rather to maintain and possibly to increase the relative cost of production. How can we emerge from the depression, other than by good luck, if we adopt policies which tend to choke the most promising single channel for the profitable employment of a large amount of additional labor and of additional material? Consequently, when the six billions or whatever it is, that are being expended for relief works have been expended, there will be very nearly as great a need for expending another six billions.

There are, of course, plenty of products, of which many agricultural products are the most conspicuous, for which there is no elastic demand, owing to the limitations on the human stomach. We shall not get a greatly increased consumption of most of the agricultural food products by the American public however great this prosperity may come to be. It is not in that direction that we can look for the absorption of any appreciable number of those who are now out of work or dependent upon government agencies for work. We can only expect these people to be absorbed in industry if important industries are able to tap an increased demand for their product by creating a situation in which they can offer those products at a relatively lower price and still make a profit.

As that condition develops, all prices may be expected to rise. No one would suggest a permanently low level of prices. In order to get a rise of prices, we need to create a situation first, in which there will be a more active demand for labor and a more active demand for additional capital, and if that is a problem which is beyond the wit of private industry, then

DR. O. M. W. SPRAGUE

the prospects for the future are by no means promising. Failure in these directions is responsible for the urge toward the adoption of some sort of a monetary device to extricate ourselves from the present situation and to bring about a rise of prices. But there is no possible monetary means of bringing about a rise in prices except that or other than that of a situation in which there is an active demand for more credit and currency —with one exception. There is one method of bringing about at least a temporary rise in prices. Monetary measures which would excite universal distrust of the currency and a flight into tangible goods and equities would doubtless yield an upward spurt of prices. If monetary policies were adopted, calculated to reduce the value of the dollar to a nickel, they would have such an effect on confidence in the currency as to induce a wholesale withdrawal of deposits in order to buy anything that was tangible.

Distrust as a Price Raiser

Extreme inflation, in other words, leading to distrust can bring about a temporary rise of prices, with all of the consequences made familiar in the experience of some of the European countries. But our government does not contemplate a measure of that sort, nor do the people in Congress. There it seems to be supposed that just a little depreciation or just a little inflation will almost automatically bring about a rise of prices. And it does not do it. It does not excite

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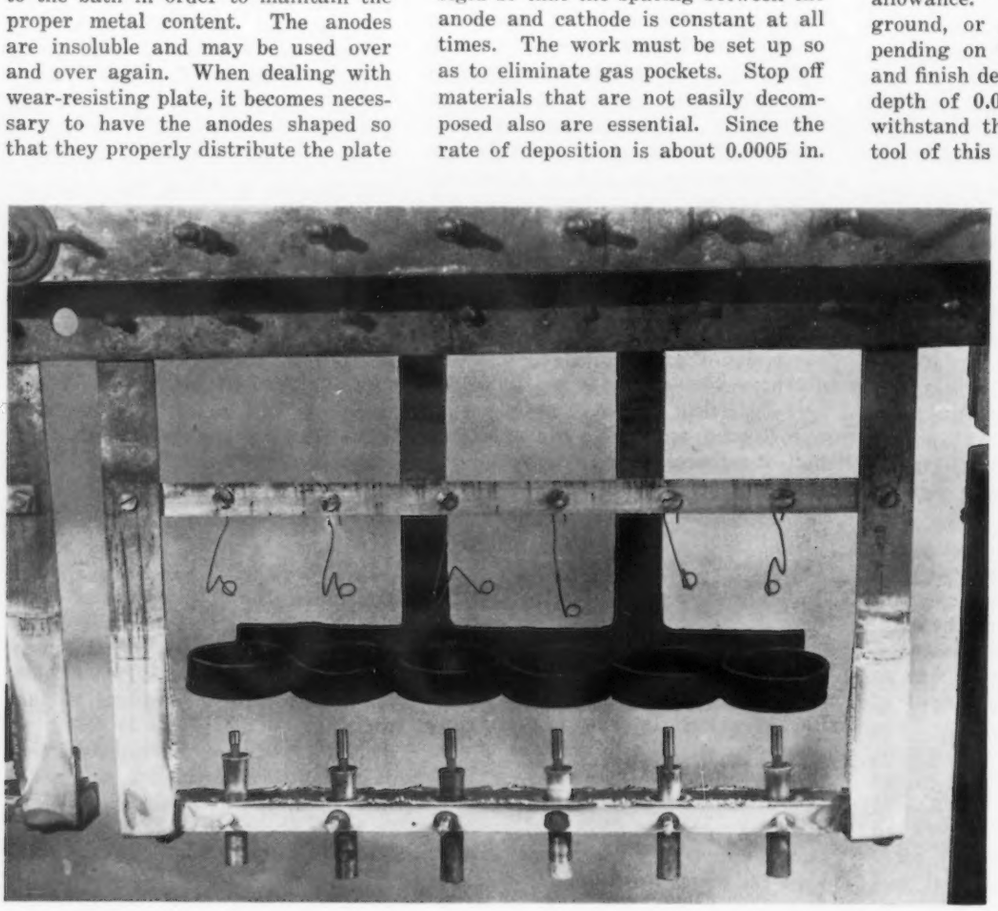
Industrial Chromium Plating—10

By D. A. NEMSER
Chief Metallurgist, Pratt & Whitney Co.

WHEN the base metal has been properly cleaned and prepared, the plate will have excellent adherence. Of the common materials gray cast iron and the tungsten steels, with high speed steel outstanding, offer the greatest difficulties. A surface passivity presumably caused by graphite in the cast iron and tungstides in the tungsten steels often becomes manifest, and the part either will not plate at all or else the plate will peel due to poor adherence. It is essential that prime metal be exposed for plate deposition. A sandblast finish on these two types of metals ordinarily helps considerably.

It is generally known that lead anodes are employed for chromium plating. The chromium metal is taken from the electrolyte, and at regular intervals additions are made to the bath in order to maintain the proper metal content. The anodes are insoluble and may be used over and over again. When dealing with wear-resisting plate, it becomes necessary to have the anodes shaped so that they properly distribute the plate on the part being plated. This is made necessary because of the extremely low cathode efficiency of the plating system. A very small percentage of the electrical energy is used in the deposition of the chromium, the energy being mostly consumed in the electrolysis of the water with the accompanying evolution of large quantities of hydrogen at the cathode and oxygen at the anode. The building of suitable conforming anodes is extremely important and overshadows in importance the knowledge of the electro-chemistry involved in the plating reactions. Suitable "thieves" to prevent plate build-up must be provided. Fixtures must be rigid so that the spacing between the anode and cathode is constant at all times. The work must be set up so as to eliminate gas pockets. Stop off materials that are not easily decomposed also are essential. Since the rate of deposition is about 0.0005 in. to 0.001 in. per hour, the work must remain in the tanks for extended periods for the heavier plates. Ordinary stop off materials will break down and allow plating to take place through the leaks.

The most outstanding application of chromium plate in connection with tools is on the cylindrical plug gage. Records of from five to ten times the production obtained on gages made of the best grades of alloy tool steels are obtained. When cost and performance are considered, this application places chromium plate in an outstanding position. It is no exaggeration to predict that this type of tool eventually will be almost exclusively furnished with a chromium plated surface. It is customary to grind the gage 0.003 in. to 0.004 in. under size on diameter before plating. Sufficient plate is added to include a grinding allowance. The finish might be ground, or ground and lapped, depending on the mechanical tolerance and finish desired. The residual plate depth of 0.0015 in. to 0.002 in. will withstand the normal abuse given a tool of this sort throughout its life.



A typical setup for heavy plating to a depth of 0.005 in. to 0.006 in. on steel cylindrical plug gages. This shows how the gages are clamped in position with conforming anodes which will be lowered into place together with "thief" wires to prevent plate built-up on the edges.

When worn undersize the gage can be stripped and replated. A liberal radius should be ground on the entering end of the gage before plating. This radius should be ground as large as is permissible after plating in order to eliminate the tendency to chip. Flat, snap and cylindrical ring gages also are being plated to excellent advantage.

Reamers for use on non-ferrous alloys, cast iron and many ferrous applications have given excellent service. For this type of tool, the plate is allowed to remain in the flutes only. This is accomplished by plating the reamers when they are oversize on the outside diameter. After plating, they are ground to size. Thus the cutting actually takes place against a chromium edge, which offers maximum wear resistance against the soft abrasive materials, such as aluminum alloys, brass, copper and nickel alloys. In addition, the plate in the flute insures rapid chip disposal. A plate depth of 0.0002 in. to 0.0003 in. ordinarily is employed. Whenever cutting conditions permit, a carbon steel reamer should be used in preference to one of high-speed steel.

Taps and drills for machining abrasive materials such as Bakelite and for soft metals will show decidedly improved performance after plating. The plate depth is usually 0.0001 in. to 0.0002 in. The flutes of these tools should be polished after plating. In fact, all cutting tools should have the plate removed from one of the cutting faces, as a cutting edge of chromium plate is undesirable because of its brittleness and consequent tendency to chip.

VARIOUS cutting tools for both hard and soft metals, as well as dies, rolls, gages, etc., are given a marked increase in length of life by means of chromium plating and replating. New fields of application are being found daily. It is therefore a timely subject of interest to a broad industrial field.

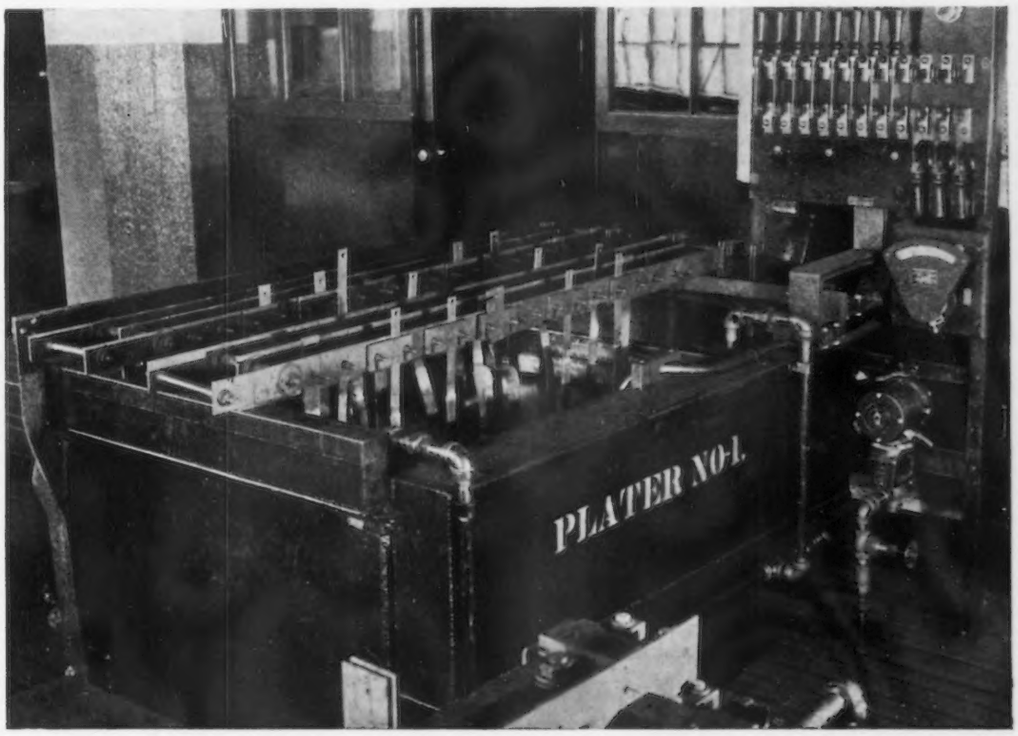
In this article, which is the concluding installment of the author's treatment of the subject, valuable data are presented as to technique of application. The first of these two articles appeared in our preceding issue. These are a part of our general series on metal finishing.

Various cutting tools for the soft metals, such as copper, offer another field of application.

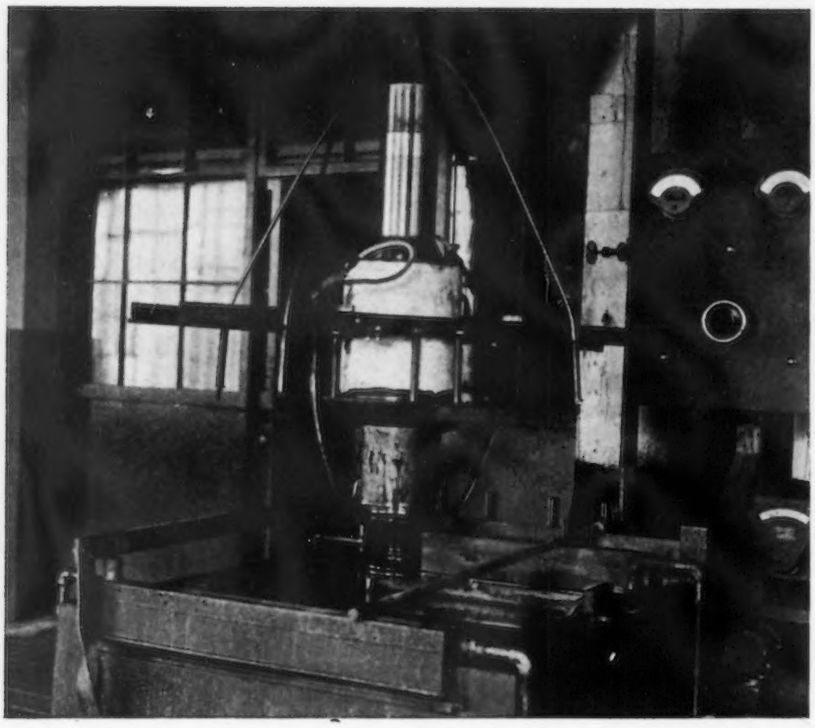
Drawing dies, forming dies and rolls for working soft metals such as copper, brass, nickel, gold, silver, palladium, platinum and many others are greatly aided by chromium plate. Metals of this type adhere to the dies, causing short tool life and a poor finish on the metal being worked. Chromium plate entirely eliminates this tendency to stick and thereby yields added tool life and a better finish to the metal. Drawing and forming dies for steel also have been plated successfully, particularly for the working of the softer steels. A plate depth of 0.0015 in. to 0.002 in. is satisfactory when applied to the fully hardened drawing die or forming tool. If the mechanical tolerance is not too close, the die is lapped after plating. Otherwise sufficient plate must be added to allow for grinding. The residual plate depth of the rolls is usually held between 0.005 in. and 0.008 in. Grinding is resorted to for properly maintaining mechanical accuracy.

Molds for the forming of resinous products such as Bakelite, and for molding celluloid and kindred compounds, are rendered far more serviceable by the application of chromium plate. Prevention of sticking in the mold and a product with high lustre result. Mold life is also appreciably prolonged. It is customary to buff the molds before plating and to add a plate depth of 0.00015 in. to 0.0002 in. Buffing after plating is resorted to if the plate is not entirely bright, since an extremely smooth and brilliant finish is required. Rubber molds are plated to advantage. In this case the corrosion action of the sulphur compounds in the rubber is withstood because of the passiveness of the plate. The product is smoother and of better lustre. Molds for making ceramic parts will show added life when plated.

In the paper industry many parts are plated with chromium to give wear resistance and also to counteract



A plating tank showing rigid superstructure for holding anodes and cathodes.



Salvaging the worn bearings on a heavy steel roll by building up with chromium plate and then refinishing to size. The cylindrical anode around the bearing surface is in position ready for plating.

the corrosive action of the sulphite pulp. The textile industry employs chromium plate extensively to obtain wear resistance against the abrasive action of the thread fibre.

For moderate pressures, a minimum depth of 0.002 in. of plate should prove satisfactory on a steel base treated to a Rockwell hardness of C55 to C60. It is desirable to have a Rockwell hardness of C62 or over on a steel base when heavy pressures are encountered, especially if the plate must be minimized. Under these conditions, the depth should be at least 0.001 in.

Due to the hydrogen pickup, with consequent brittleness, small tool parts that are fully hardened might crack open during plating. Apparently this brittleness intensifies at an internal defect, such as a seam. As a result, the hard steel tool with its inherent lack of toughness and malleability, will crack. Tempering these tools to a Rockwell of C55 to C60 will overcome this tendency.

Chromium plate may truly be termed the industrial "putting-on" tool. It is being used to salvage many parts in every field of manufacture. Gears, spindles, miscellaneous small tool and machine tool parts, engine parts and a host of others too numerous to mention have been rendered usable at a fraction of the cost of the part. In many instances, the performance of the plated parts have been superior to the unplated product, and as a result chromium plate has been adopted as a standard procedure.

New fields of application are being found daily. This growth is fostered both by the development in plating technique and by the manufacturers' appreciation of the properties of industrial chromium plate as distinguished from decorative plate.

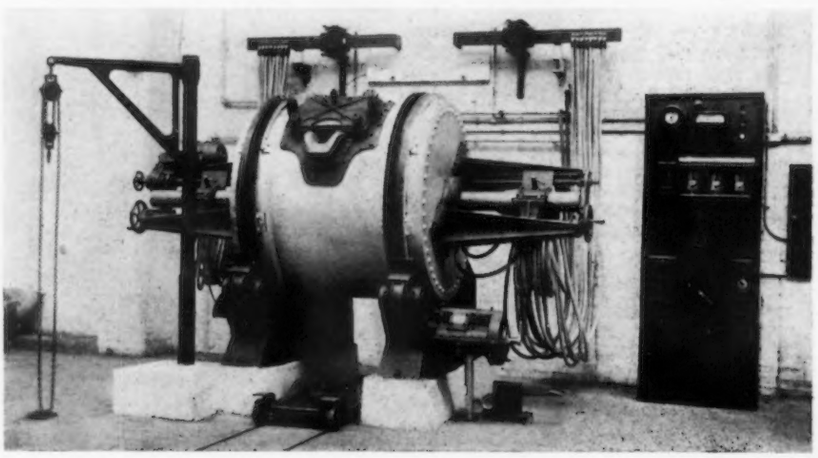
Detroit Electric Furnace In British Plant

AT the Westwood works, Peterborough, England, of Baker-Perkins, Ltd., manufacturer of food machinery, laundry machinery, and also mixing machinery for rubber, wood pulp, chemicals and other materials, a type AA rocking furnace of the Detroit Electric Furnace Co., Detroit, has been installed. It makes use of the borings, turnings and scrap turned out in large quantities by the machine shops of the company.

The Baker-Perkins American plant at Saginaw, Mich., has used the indirect arc rocking furnace for about four years, and when the British headquarters' plant decided on electric melting, the same type of unit was selected. A. E. Rhoads, vice-president of the Detroit Electric Furnace Co., who recently returned from England, says the new furnace at Peterborough is now on a regular schedule of one heat of steel a day, with the remainder of the time given over to the melting of gray and white iron.

The furnace is operated on cold charges of 1000 lb. each. The electric gray iron now obtained shows 30 per cent increased tensile strength and a 25 per cent better rate of machining, it is stated. Charges of 50 per cent cast iron borings and 50 per cent foundry re-melt and steel scrap are melted and superheated to 2950 deg. F. in 50 min.

White iron is made synthetically from steel scrap, with crushed coke added to supply the desired carbon content. This iron is used for making certain rolls, gears and abrasion-resisting parts. It is heat treated to produce high-strength castings (100,000 lb. per sq. in. with 2 to 4 per cent elongation), or castings requiring less strength and greater toughness, these last being heat treated to register 50,000 to 60,000 lb. tensile strength with an elongation of 10 to 15 per cent. Electric steel castings made in the furnace show strengths of 90,000 to 94,000 lb. per sq. in.



Preventing Porosity in Non-Ferrous Castings

By J. H. CHEETHAM
Factory Manager, Chance Co., Centralia, Mo.

HOW numerous agents, each considered in turn, serve to deoxidize and degasify the molten non-ferrous mixtures, thereby to produce acceptable castings, is the burden of the accompanying article. It covers also the methods to be followed to promote density in the castings. It will be supplemented by a final article devoted to the agents and procedure that will provide suitable fluidity in the metal and required hardness in the final product. In THE IRON AGE of Feb. 1 appeared the introductory article of the series, which described the causes of so-called porosity.

IN general, in the case of non-ferrous castings, if it is remembered that oxidized metal is a chemical ailment and gasified metal is a mechanical ailment, elimination will be easier. To degasify metal is to prevent the metal absorbing oxygen and other gases by the use of proper melting and pouring temperature control. This is obtained by the use of a neutralized flame, in the case of oil furnaces, and in all types of furnaces metal must not be allowed to absorb gases from the oil, coke, or coal. The best results are obtained by means of a proper metal protective covering explained later.

Deoxidizing and Degasifying Agents

To deoxidize metal is to remove the combined or metallic oxides, cupric (CuO-black) or cuprous (Cu_2O-red), in brass and bronze mixtures caused by the absorption of oxygen either in its ore state or in the melting process. To do this requires the addition of elements having a high affinity for oxygen, addition of an agitator to drive the oxides to the surface or addition of an element to prevent additional oxygen being absorbed by the metal. As degasifying and deoxidizing metal is so closely related, in that to eliminate a chemical fault, some mechanical means must be resorted to and vice versa, its fluxes can readily come under one heading. Referring to the list of elements which have a deoxidizing and degasifying effect, we find listed:

1—Phosphorus
2—Boron
3—Zinc
4—Manganese
5—Silicon
6—Soda ash
7—Slack lime
8—Plaster of Paris
9—Glass
10—Borax
11—Charcoal
12—Salt
13—Salammoniac
14—Zinc chloride
15—Bicarbonate of soda
16—Barium sulphate

Phosphorus:

Phosphorus is now commercially sold and used in waffle or shot form and can be readily purchased in 10 and 15 per cent grades, the balance being copper or tin. Copper being the most popular in this form, it can be readily handled before and during its application and is more effective than the old method of using pure phosphorus. It is one of the most active and effective deoxidizers known, as well as the most abused, because of overdosing, which causes more trouble than good. Phosphorus has a strong affinity for copper oxides and precipitates copper sulphate into the slag.

Briefly, 15 per cent phosphor copper is most popular, but should not be used in nickel, high zinc, or aluminum alloys. Phosphor tin should be used exactly as phosphor copper, except allowances for tin should be made in the mixture. One-half ounce to one ounce for ingot or new metals and 2 to 3 oz. for scrap metals added to 100 lb. of metal melted is sufficient, and should be added at the same time tin, lead, or zinc is added to the melt, which is generally from 10 to 20 min. before pouring. An excess of phosphor copper gives hard, dirty castings, eats into cores and sand, which makes rough, ragged castings in the form of rivulets.

It is better to add phosphorus at above stated time, so that it will also react on secondary oxides not taken care of by tin and zinc as well as reacting on zinc oxides. The author has found that a great deal of the phosphor is wasted when put into the furnace at the beginning of the charge and the general benefits are not accomplished. Also, if phosphor copper is added in the ladle, it does not act effectively as a deoxidizer, as the time is too short and it cannot be thoroughly mixed with the metal. However, the author recommends the use of about ¼ oz. (the size of a hickory nut) to the ladle directly after skimming to prevent surface oxidation. This, of course, is not for deoxidizing or degasifying, but to increase fluidity.

Phosphorus copper is being increasingly used as a deoxidizer, as it cleans and increases the fluidity if a few ounces per 100 lb. are used. Small amounts of phosphor copper in high zinc and manganese bronze have been found very beneficial. A good rule is that the amount for scrap mixtures should be double that for ingot mixtures. Up to 0.60 per cent does not harden bronze mixtures. Bearing bronzes with 0.25 per cent to 0.35 per cent are better than with mixtures of 0.80 per cent and over. Care should be used when skimming the ladle, as it livens up the metal considerably and, when charcoal or wood is used, it is hard to keep the charcoal out of the mold.

The use of too much phosphorus makes the skin of the casting almost impossible to machine and the metal sets before the air and gas escape, resulting in porous castings.

Boron:

Boron alloyed with copper as boron copper is generally used. Boron is commonly compounded with borax, which is also a very good deoxidizer. The writer does not favor the use of boron because of its high cost and feels that equally as good results can

be obtained with cheaper fluxes. Due to its high melting point, it does not act as effectively or as readily, even when in combination with copper to reduce its melting point, as fluxes with a lower melting point than the metal itself.

Zinc:

Zinc amalgamates with copper freely and makes copper fit for casting. Due to its low melting point, 786 deg. F., and low boiling point, 918 deg. C., it agitates the metal, drives the copper oxides, Cu_2O, to the surface of the metal, where they are caught by the additional metal film or covering. It is, therefore, known as a good deoxidizer. One to 3 per cent zinc in electrical copper is very beneficial for obtaining sound castings, but reduces the conductivity too much for practical purposes. It is safe to use for copper hammers and tools.

Manganese:

Manganese has a great affinity for sulphur and oxides and will remove them to the surface in the form of a slag. As a deoxidizer it can be used in small amounts 0.1 or 0.5 per cent of 30 per cent manganese copper. However, due to high cost and the danger of overheating, which causes excessive shrinkages, porosity, and leaky pressure castings, the writer does not favor it as a deoxidizer, but as a strengthener.

Silicon:

Silicon is commonly combined with oxygen, as silica. It is the base ingredient of sand and glass. It alloys readily with copper and is a good deoxidizer, as it combines with the oxygen in blow holes. However, it causes a foaming action, which makes spongy, leaky castings. It is good to use 0.02 to 0.07 per cent for high tensile strength bronze casting and is equal to aluminum bronze in physical quality. It is more readily used in the form of silicon copper.

The author finds that silicon when properly used does not hurt brass and bronze alloys. Copper brazes easier when fluxed with silicon than when fluxed with phosphorus.

It is a cleaner and hardener for aluminum casting and is extensively used with aluminum. Silicon acts on copper about the same way but better than phosphorus, as it is a more natural alloy. It is a scavenger for copper oxides and brings them to the surface in the form of slag; however, it should be used in small quantities, 2 to 4 oz. of 10 per cent silicon-copper to each 100 lb. of metal melted. This is contrary to the propaganda that the silicon in carborundum ladles and furnace linings causes porous castings. The writer recommends silicon as a deoxidizer, used in the form of silica (sand or glass) or compounded with some element, such as copper. If silicon is not wanted in the alloy, it can be removed readily by using 50/50 copper oxide and common salt.

Sodium Carbonate (Soda Ash):

Soda ash is generally used to deoxidize copper of its sulphur. Having a strong affinity for chlorine it is used as a scavenger rather than a deoxidizer. The use of soda ash is confined mostly to smelting refiners. Soda ash makes a good metal covering, but in the general run of metal now commercially used, it has little value except with grindings and again it does not pay to use grindings with regular brass mixtures, owing to high fuel cost and metal losses. It is very destructive to crucibles and furnace linings.

Calcium Hydroxide (Slack Lime):

Slack lime is an earth alkaline and being a calcium is a good scavenger for oxygen and impurities. Due to its high melting point, it does not act as efficiently or as readily as the sodium class fluxes and is not recommended for general foundry use.

Calcium Sulphate (Plaster of Paris):

Plaster of Paris is an earth alkaline and being a calcium is a good scavenger for oxygen and impurities. Due to its high melting point, it does not act as efficiently or as readily as the sodium class fluxes and is not recommended for general foundry use. It adds sulphur in the form of sulphide to alloys with lead, and if temperature is too high it develops sulphur dioxide which causes excessive porosity.

Glass:

Glass is principally silica. Owing to its low melting point (1300 deg. F.) it melts before the elements which are generally put in the furnace first. As it makes an almost immediate covering, it is an excellent deoxidizer and acts as an oxygen-proof metal covering. It also prevents oxidation of lower melting point elements, such as zinc, which often boils when brought up to the melting point of some other elements, such as copper, nickel, etc. However, unless combined with some other element, it is hard to use as it is very sticky, hard to skim off and renders the crucible difficult to clean.

Sodium Borate (Borax):

Sodium, being mineral and of low melting point, is a very good metal flux for purifying and deoxidizing non-ferrous metals. As it contains some boron, it deoxidizes copper readily and is a great help to make good castings. In melting it throws off different salts. It is often thought, due to its affinity for some metals, to cause a high shrinkage, but by tests of the author this is contrary to actual experience. The total furnace shrinkage on 13,000,000 lb. of 85-5-5-5 metal melted was 1½ per cent with the use of 8 lb. of borax to a ton of metal (2 lb. to every 500 lb. charge) figured on the basis of total weight of metal input and actual weight of metal checked out of foundry; concentrates, floor sweepings, and metal extracted from furnace linings, were weighed and taken into account. The cost, approximately 1¾c. per 100 lb. of metal used, is very cheap. Due to its low melting point, it cleans the metal very readily without attacking the prime metal and, when put into the furnace, it acts as a metal covering before metal is entirely melted, thereby helping to prevent the metal absorbing gases.

Borax is unsuitable for aluminum melting as it possesses a re-acting effect.

Charcoal:

Atmospheric air contains practically 23 per cent oxygen and 77 per cent nitrogen by weight. Oxygen is the active gas which attacks the metal, causing a film of oxide or dross to form on the surface.

It has been proved time and again that the use of charcoal is a benefit to brass and bronze as a deoxidizer and degasifier in that, when the metal is poured on it in the ladle, it agitates the metal and brings oxides to the surface which are then more readily skimmed off and leaves the metal freer running. If the charcoal is left on top of the metal, the carbon is burned before the oxygen attacks the metal and carbon dioxide gas (CO_2) is formed which helps prevent metals absorbing oxygen before and during the pouring process. However, it is not practical to skim the metal and leave the charcoal on the surface, nor would it be practical to add additional charcoal on the metal surface as the charcoal crackles up into small pieces, and it is hard to keep it out of the sprue. Therefore, to replace the charcoal, after skimming, a wood block (½ to 1 in. thick

by 3 to 4 in. square is preferable) should be used especially for all jobs poured at a high temperature. It is best to add the wood block at the pouring station to eliminate the smudge and prevent the room getting full of smoke. Wood, sawdust of cream of tartar are often used as substitutes for charcoal and work equally as well.

Sodium Chloride (Salt):

Salt is in the sodium mineral class and, owing to its low melting point (1481 deg. F.) as well as its having a powerful affinity for oxygen, and alloying readily with tin at low melting temperatures, it makes a wonderful deoxidizer and purifier for nearly all metals. Salt can readily be used in small quantities at the beginning of the heat; otherwise, if added during the melt in crucible or open flame furnaces, the chlorine gas fumes are almost intolerable and settle down near the floor due to the gas being heavier than air. The author recommends 1 lb. to a 500 lb. charge in combination with borax.

Ammonium Chloride (Salammoniac):

Salammoniac is an excellent oxidizer and purifier for aluminum but should never be used for brass or bronze. Fluxes are not generally used in good aluminum foundry work because of the use of new aluminum or alloys. But should scrap or borings be used, a flux of salammoniac and metal covering (zinc chloride) should be used.

Zinc Chloride:

Zinc chloride is a good oxidizer, purifier, and metal covering for aluminum but not for brass or bronze. It is exceptionally good to use with chips or borings, as it deoxidizes the metal and gives it a good coating which reduces the shrinkage. The only trouble with its use is that it cuts the throat and lungs worse than salt fumes.

Bicarbonate of Soda (Baking Powder):

This has a similar action to salt only in a milder form and is more readily used in crucibles or furnaces where the fumes would otherwise be a detriment to the workmen.

Barium Sulphate:

Barium sulphate is an earth alkaline and makes a very selective oxidizing agent by amalgamating with the metal oxides and unharming the elements, even of low melting points, such as zinc. While the sulphate acts as a deoxidizer, it also increases the sulphur content, especially with alloys containing lead, in the form of sulphide. This flux should be added to furnace at time of adding tin or during the first skimming process.

Author does not recommend its use due to the danger of increasing porosity should the temperature of the metal be too high.

Agents to Increase Density

To render the metal dense is to overcome a mechanical error in the process by a chemical healer. This means that alloys can be made stronger, tougher, or harder by the use of an element which will have an affinity for each element so as to make a better (so-called) cement. Referring to the list of flux elements which have a densifying effect we have

1—Nickel
2—Manganese
3—Iron

Of course, tin is generally used to strengthen the alloys and make them dense, and as it is part of the alloy, it would not come under the flux class.

Nickel:

A great deal has been written in the last few years regarding the advantages in the use of nickel in nonferrous alloys. While it is the main factor in obtaining white bronze, nickel silver, etc., the author considers its use only as a "densifier." Some manufacturers whose product is mainly pressure goods, such as valves and fittings, use nickel in all their alloys and is standard practice with them. Nickel when alloyed with copper alone has a hardening effect but the writer finds when added to bronze alloys in small amounts (up to 1½ per cent nickel) it does not harden the metal but it greatly increases the toughness and elasticity, and closes the grains so as to make denser alloys, which in turn makes them harder to machine. The author also finds that nickel in some quantities counteracts oxygen in the metal and acts as a purifier and degasifier. It appears through tests that the toughness and density is not materially changed with nickel content between ½ and 4 per cent but over 4 per cent it again reacts as before with a slight increase in hardness.

Owing to the high melting point of nickel alone (2600 to 2900 deg. F.) it is not good to add the nickel in its free state when used as a flux. Nickel can be purchased alloyed with copper or tin, either alone or with both or with many other metals in almost any per cent from any of the leading companies making alloy products. Fifty per cent nickel and 50 per cent copper compound will melt at about 500 deg. F. lower than nickel alone. It is folly to try to buy these alloys on price.

Quality is the main factor and a few extra cents a pound paid for extra good quality from a reliable source means a fraction of a cent on the mixture cost and often saves dollars in obtaining the results demanded.

Certain nickel compounds such as nickel copper are better added at the beginning of the charge; while nickel and tin in small amounts up to 1 per cent can be added just before pouring with equally good results. These nickel compounds are more commonly used in the 50-nickel and 50-copper shot form. The writer has found no extra cost is involved in the use of 50 per cent tin up to 2 per cent. In other words, if 2 per cent of 50/50 nickel copper shot is used, at least 1½ per cent of the tin may be omitted and the final physical qualities of the metal will be equally as good. Nickel amalgamates readily with copper and lead and its use is an excellent means of preventing lead sweats, as it brings the two elements together in perfect harmony. The author has found that 1½ per cent of nickel will hold in solution at all times under practical conditions as high as 15 per cent lead, thereby making a more homogeneous metal, especially valuable for bearing bronzes.

Through elaborate test it has been found that bronze with 1½ per cent nickel will flow as thin a section as bronze at 75 deg. F. higher pouring temperature without nickel. Therefore, nickel acts as a "fluidizer" and negates the general belief that nickel will give a "thicker" sluggish flowing metal.

Manganese:

Manganese acts similarly to phosphorus and silicon in alloys, in that it absorbs furnace gases and decomposes the oxides during the melting process. By adding as high as 3 per cent in the melt the manganese in working off the oxides and oxygen is liberated so that only a small amount remains in the final mixture. Its effect, however, is about one-fourth that of phosphorus, which in turn makes it expensive to use.

Manganese units freely with zinc and is one of the best elements known to the author to absorb sulphur gases and liberate them in the form of slag. It can be purchased alloyed with copper with 10 to 30 per cent manganese. This makes it more applicable to use. However, if handled at the average bronze pouring temperatures, the cast-

ings will be unfit for pressure work. This is due to its high oxidation powers. When added in small amounts it is a very fine "densifying" element, which greatly increases the tensile strength to as high as 60,000 lb. per sq. in. It should first be emphasized that only all new and the best of materials should be used.

Manganese in aluminum also acts as to secure density with increased strength but it is mainly used as a hardener and corrosion resistant for brine. It can be purchased alloyed with aluminum up to 25% manganese, in which form it should not be used in an amount over 1 per cent of melt. Manganese must not be melted or poured too hot, otherwise the results will be disastrous; this fault is the cause of most losses.

Manganese in white bronze or nickel silver alloys is quite essential; in that, when free from carbon, it has about 1½ times the whitening effect of nickel on copper. As a deoxidizer it drives off the sulphur in its various forms, thereby amalgamating the iron and nickel readily with copper. If used in large amounts, i. e., over 1 per cent, the author has found it to cause dirty-surfaced castings.

Iron:

The writer does not recommend the use of iron as a deoxidizer or strengthener in commercial bronzes, as it causes eutectic segregation or hard spots. Iron is not used as a deoxidizer except in special mixtures, such as in the manufacture of bells. And even in this metal, iron is mostly used to close the grain to improve the tone of the bell. From 0.3 to 8.5 per cent iron is generally sufficient and it is best to add this in the form of an alloy, such as Ferrocopper (20-80) or Ferronickel (50-50) to obtain as pure an iron as possible at a lower melting point than when in its pure state.

Iron plays quite an important part as a deoxidizer and strengthener in white bronze, nickel silver, etc. In high nickel alloys a large per cent of oxygen is absorbed. Iron has an affinity for oxygen. It has twice the whitening effect on copper that nickel has.

Iron also helps make the alloys more homogeneous, as it helps suspend the lead in the copper matrix. The writer does not recommend over 2 per cent iron. Iron is also used extensively in small amounts in aluminum and manganese bronze.

The foregoing listing of cures for faulty non-ferrous foundry work and the methods of applying the cures will be concluded in an article on the use of agents for purifying the mixtures, for promoting fluidity and for conferring hardness on the product.

Taylor's Cutting Tools

STEVENS Institute of Technology, with the cooperation of the American Society of Mechanical Engineers and the Taylor Society, held a celebration on Dec. 7, 1933, which commemorated the fiftieth anniversary of the graduation of Frederick Winslow Taylor from Stevens Institute.

Because of Taylor's work on the cutting of metals, it was believed that a demonstration of the actual metal cutting, which would portray the great advances made possible in the metal working industries by his work, would be a very appropriate part of any such celebration.

With the assistance of the subcommittee on metal cutting data of the American Society of Mechanical Engineers, a metal cutting program was worked out, and the necessary equipment secured to put on such a demonstration. While Taylor's work on the cutting of metals has been fundamental, and is the basis of all attempts to reduce it to a science, it was felt that the progress in cutting tools caused by the discovery of the Taylor-White process of heat treatment was a much more satisfactory basis for such demonstration than his equally important work on the relation between cutting speeds, and the size and shape of the cutting tool, the depth of cut, feed, tool life under cut, and the material cut.

Because of the occasion, it was believed that it was particularly desirable to follow Taylor's own methods, as far as possible, in the conduct of such a demonstration. For this reason a ⅞ in. x 1⅜ in. round nose tool, with the characteristics given in table II, and which Taylor used as a standard was adopted. The 3/16 in. depth of cut, and 1/16 in. feed which he used when comparing the quality of tools, or the machineability of the metal cut, was also adopted. Because of time limitations it was not possible to use cutting speeds which would give tool failure in 20 min., as recommended by Taylor, when the greatest possible uniformity of results was desired. Instead, cutting speeds were used which would give tool failure in approximately 10 min.

A heavy 27 in. x 16 ft. engine lathe, with 35 hp. direct current motor drive was secured as a loan from the Niles Tool Works Co., so that there was no difficulty in getting a close approximation to any desired speed above

TABLE I

Composition and Heat Treatment of Tools Used in Demonstration.

Tool Marking	Steel Type	Chemical Composition in Per Cent: Carbon	Tungsten	Chromium	Vanadium	Manganese	Silicon
1 and 2	Carbon	1.15	...	...	...	0.23	0.18
3 and 4	Self hardening...	1.83	7.06	3.95	...	0.33	0.54
5 and 6	Self hardening...	1.83	7.06	3.95	...	0.33	0.54
7 and 8	Taylor No. 1.....	0.62	18.42	5.51	0.41	0.23	0.39
9 and 12	Modern 18-4-1....	0.70	17.61	3.84	0.93	0.26	0.27

Tool Marking	Heat Treatment: Temp.	Anneal Time in Min.	Temp.	Pre-heat Time in Min.	Temp.	Harden-ing Time in Min.	Quench	Temp.	Tempering Time in Min.
1 and 2	1400	180	...	..	1450	10	Water	260	60
3 and 4	1550	180	...	..	1450	10	Air	...	..
5 and 6	1550	180	1600	20	2100	7	Lead at 1100	1000	60
7 and 8	1550	180	1600	30	2400	4	Oil	1100	120
9 and 12	1550	180	1600	30	2400	4	Oil	1100	120

TABLE II

Characteristics of Tool Form and Size.

All tools were ⅞ in. x 1⅜ in., forged as recommended in "The Art of Cutting Metals," by Frederick W. Taylor, except that, inadvertantly, the nose was not set over. Tools were all ground to the standard there given for a ⅞ in. blunt tool, on a Sellers automatic tool grinder. All steels were furnished by the Crucible Steel Co. The carbon tool steel, and the modern 18-4-1 steels are standard steels, as furnished today, but the self hardening and Taylor No. 1 steels were made up especially for the demonstration.

Nose radius.....	9/32 in.
Side rake.....	14 deg.
Back rake.....	8 deg.
Clearance	6 deg.

Compared With Modern 18-4-1 Steels

the minimum speed of the lathe, and in taking a cut of the size desired without any trace of distress.

A billet of medium carbon steel, of which the chemical and physical characteristics are given in Table III, was secured as a gift from the United States Steel Corpn. This billet was heat treated at 1247-1265 deg. F., cooled in the furnace to 932 deg. F., and then to atmospheric temperature in the air, in an attempt to secure a structure which would be as uniform as possible, in actual metal cutting.

The composition and heat treatment of the tools used are given in Table I. The carbon tool steel, which is of a grade now on the market, is very similar to the Jessop Carbon Tool steel, No. 85 in Folder No. 20, in "On the Art of Cutting Metals." Much of Taylor's early work was done with a steel of this general type.

The self-hardening steel used is no longer on the market, although it conforms closely to steel No. 26, folder No. 20, which was developed by the Sanderson Tool Steel Co. Nearly 100 tons of this steel was furnished by Bethlehem Steel Co. in 1900 by Sanderson, of which a large part was

FREDERICK W. TAYLOR'S cutting tools compare favorably in performance with average high-grade cutting steels of today, according to a series of tests made at Stevens Institute of Technology recently. These tests formed part of a celebration which commemorated Mr. Taylor's fiftieth anniversary as a graduate of Stevens.

probably used in their demonstration of the Taylor-White process at the Paris exposition in that year. Tools 3 and 4 were given a heat treatment such as was customary before the discovery of the Taylor-White process, while tools 5 and 6 were treated according to that process.

Tools 7 and 8 have substantially the same analysis as tool steel No. 1, folder No. 20, in "On the Art of Cutting Metals," of which Taylor stated, "This is the best high speed steel tool with which we have experimented."

Tools 9 and 10, which were included to make possible a comparison with modern practice, were made from a good modern 18-4-1 steel, such as is being used at present for approximately 65 per cent of the metal cutting done in this country.

All tool steels were furnished by the Crucible Steel Co., who made up special heats of the self hardening and Taylor No. 1 steels, which have not been used commercially for many years.

To insure tool uniformity, all tools were heat treated by Brown & Sharpe in Hayes electric box type furnaces, having a furnace atmosphere controlled at approximately 8 per cent CO, with the exception of the carbon steel and low heat self hardening steel, which were hardened in a salt bath.

The results of the tests with these various tools is given in Table IV. All the significant preliminary results are given, in addition to those obtained in the actual demonstrations. The great increase in cutting ability imparted to a tool by the Taylor-White process over a similar tool heat treated according to previous practice, is particularly interesting. It is also noticeable that the present day 18-4-1 steel, which is the present day standard, has substantially the same cutting ability as that of the No. 1 tool steel used by Taylor in 1906.

Robert T. Kent, presided over the demonstration and introduced the speakers, L. P. Alford and Carl G. Barth.

There was a capacity audience of over 300 present on Thursday, and over a hundred on Saturday, when the entire demonstration was repeated.

At the close of the demonstration on Saturday, Mr. Barth presented to the Society the depth of cut, and the tool contour gages which he had used in 1902 and 1903, in conducting much of the experimental work which Taylor incorporated in "On the Art of Cutting Metals." These gages, which are of very real historical interest, will be of great value in the conduct of such experimental work on the cutting of metal as the Subcommittee on Metal Cutting Data, of the Special Research Committee on the Cutting of Metal proposes to carry on in the near future.

TABLE III

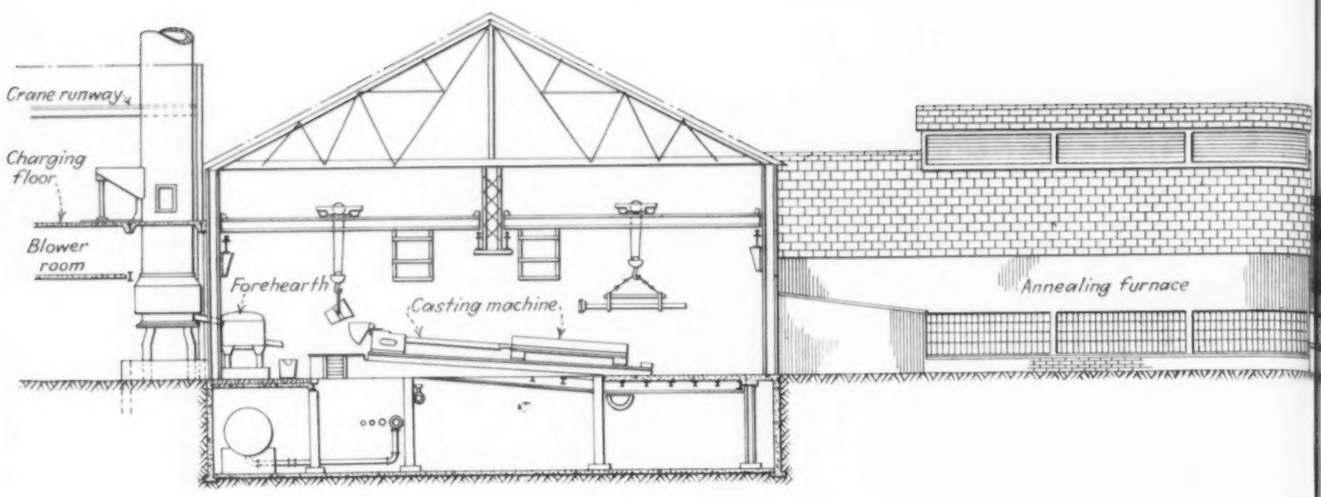
Chemical and Physical Characteristics of Metal Cut.

		Physical	
Carbon	0.43	Ultimate strength, average lb. per sq. in.	71,000
Manganese	0.73	Yield point	44,000
Phosphorus	0.024	Elongation, per cent in 2 in.	32.5
Sulphur	0.031	Reduction in area, per cent	50
Silicon	0.204	Hardness Number, Brinell	139

TABLE IV

Results of Tests.

Tool Marking	Tool Type	Grind Number	Depth of Cut, In.	Feed, In.	Cutting Speed	Test Tool Life	Calc. Cutting Speed 30 Min. Tool Life
1	Carbon	2	3/16	1/16	15.5	1.91	8.9
		3	3/16	1/16	14.5	4.80	10.0
		4	3/16	1/16	17.5	4.75	12.1
		5	3/16	1/16	15.0	14.75	13.0
4	Self hardening	2	3/16	1/16	40.0	0.75	19.2
		3	3/16	1/16	25.5	1.50	14.0
		4	3/16	1/16	20.0	4.00	13.4
		5	3/16	1/16	17.5	8.50	13.6
		6	3/16	1/16	19.0	6.23	13.9
5	Self hardening	4	3/16	1/16	80.0	2.08	47.0
		5	3/16	1/16	70.0	3.00	43.9
		6	3/16	1/16	56.0	10.50	45.4
		7	3/16	1/16	58.0	11.03	47.4
7	Taylor Best	3	3/16	1/16	97.0	8.00	82.1
		4	3/16	1/16	102.0	2.93	73.6
		5	3/16	1/16	86.0	11.00	75.6
		6	3/16	1/16	85.0	6.00	69.4
9	Modern 18-4-1	3	3/16	1/16	90.0	7.33	75.5
		4	3/16	1/16	87.0	19.80	82.4
		5	3/16	1/16	88.5	9.25	76.4



Improved Gray Iron Structure Without Chill

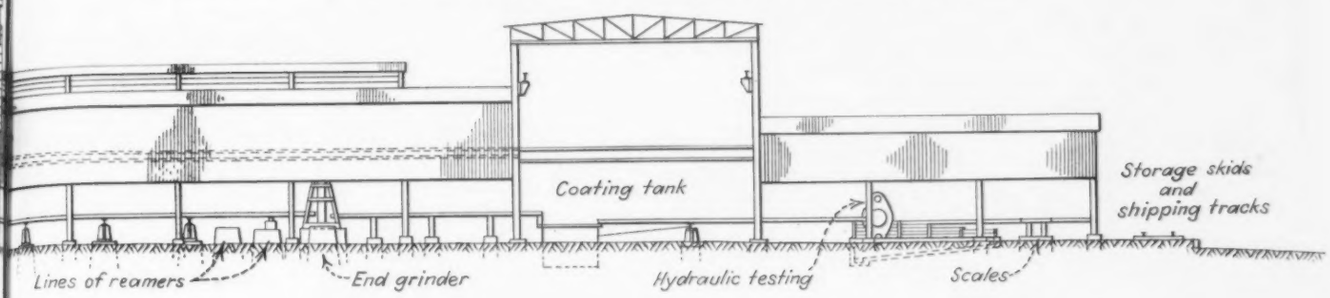
A NOTABLE development in the manufacture of deLavaud centrifugally cast pipe has been achieved by the United States Pipe & Foundry Co. It amounts to applying powder to the inside of the permanent mold of the casting machine in such a way that not only is chilling of the iron prevented but instead a grain structure is obtained that imparts increases in both strength and ductility over the former practice. The new process has been in commercial operation for something like a year and the centrifugally cast pipe now made is known as super-deLavaud pipe. The methods of manufacture and some notable tests of the pipe were recently observed at the Burlington, N. J., plant of the company. The super-deLavaud pipe is also made at the company's Bessemer, Ala., and Birmingham works, and some of the accompanying illustrations show the installation recently completed at Bessemer.

Two cupolas discharge into this forehearth, which serves as a mixer or conditioner, so that quality and temperature of the iron may be kept under close control.

The inherent difference in the previous standard deLavaud product and the super-deLavaud is evidenced in fracture tests. In the case of the previous standard product, cracks developed longitudinally in the pipe and bursting was accompanied by a large number of fragments. Cracks in the case of the super-deLavaud pipe extend irregularly and for short distances from a center with little opportunity for fragmentation on final fracture.

The central feature of the new process appears to lie not merely in the use of a suitable powdered material to check the rapid flow of heat from the molten iron to mold but in the method of applying it. Any one of several out of a large number of powders will perform satisfactorily, it has been found, but much investigation and experimenting was carried on before arriving at an effective and commercially feasible method of getting the powder to the work. The solving of the problem in a relatively short time must bring a measure of satisfaction to the management of the company, which had the courage

The annealing furnace is long enough to take the product of the casting machines and to put each pipe through the desired annealing cycle. Immediately beyond, the pipe interiors are reamed by means of revolving knobblers passed back and forth through them and the ends are ground as may be necessary; then the pipes in groups are immersed in a tar coating compound, the finished pipe is tested under pulsating water pressure for defects, and then, over weighing scales, reaches the storage skids or waiting railroad car for immediate shipment.



Obtained in Centrifugally Cast Pipe ▲ ▲ ▲

in the days of 1930 to embark on an ambitious scale of research, concentrating its existing facilities and erecting a new building at Burlington for metallurgical, chemical and physical investigations, as described in THE IRON AGE of Nov. 13, 1930.

Suffice it to say that as finally arranged a closely measured quantity of the powder, depending on diameter and length of pipe to be made, is delivered to the mold for every cast. The container for the powder is a specially designed chamber mounted on each casting machine. A small adjustable vane serves to divert from the container as it revolves the desired amount of powder, after the fashion that a knife gate at a given point removes from a traveling belt conveyor part of the material being carried on the conveyor. The powder released from the container is caught by the inducing action of a stream of compressed air running through a pipe to which the powder outlet is connected. This pipe runs alongside the molten iron runner or trough of the casting machine.

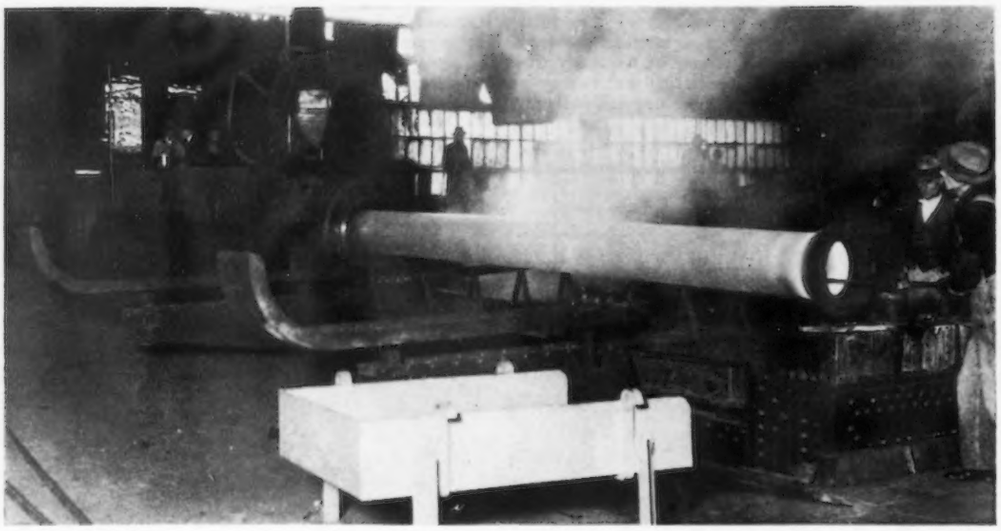
Near the end of the iron runner, the air pipe terminates in a nozzle designed to deposit the mixture of air and powder on the mold wall. The iron leaves the runner in a stream about 3 in. wide. As the pipe mold is revolving and at the same time receding from the runner end (at the beginning of casting, the machine carriage carrying the mold entirely encloses the iron runner; the outer end of the pipe is that first formed, so that when the pipe length is completed, the carriage with its mold has moved away from and has uncovered the runner), the molten iron stream covers the path of a helix. The longitudinal movement of the carriage with its mold and the rotary speed of the mold are such that the molten iron is held to an even thickness against the mold by the action of centrifugal force and there is quick solidification into a complete pipe length.

The position and shape of the nozzle is such that the powder is being deposited on the mold just before the molten iron reaches it. The arrangement, which resulted, as already stated, after much experimentation, provides that a minimum of powder

▲ ▲ ▲

The tilting hopper at the left holds the proper amount of molten iron for the pipe length to be made and the rate of its tilting under motor control serves to deliver to the runner a steady flow of the iron. The picture shows the taking of temperature by means of an optical pyrometer. The carriage is in the act of receding as the mold is likewise revolving, the runner shown penetrating the carriage in the line of the axis.

▼ ▼ ▼



A tee-ended bar inserted through the completed pipe holds it as the carriage returns to the starting position and the pipe is then rolled over to the left on the skids. The carriage is brought back again to the end or bottom position, when the core for the bell end is inserted, while the helpers at the other end clean out and swab the runner for the next cast.

is used. It would appear, however, that the use of a carrier gas, (in this case, compressed air), for depositing the powder at the proper point and at the exactly proper moment is essential. Besides transporting the powder from container to nozzle, the air performs the function of a heat insulator. In the very small fraction of a second between the impinging of the powder on the mold wall and the coming on the same spot of the molten iron, the air has had little or no chance to escape from the mixture. Thus there is a thin film of aerated powder with the air entrained in it serving as an insulator against the chilling effect of the mold.

The shape and form of the nozzles constituted also an experimental problem of considerable magnitude. The final shape is that of a cone with numerous circular perforations so sized and spaced that the cross-sectional area of the cone interior at any point looking toward the apex is always equivalent to the combined areas of the orifices beyond that point.

To prove the quality of the super-deLavaud pipe, a series of impact tests were observed on the Burlington visit. Also, in addition, tensile test records and photomicrographs were examined. The tensile tests indicated equal ultimate strength for both the standard and the super pipe material, but the stress-strain curves showed 62 per cent greater deformation before failure for the super product, that is,

The core in the bell end is cleaned out and the completed length is swung by crane to the receiving end of the annealing oven. The molten iron for the next cast may be seen in the hopper, while at the right is shown the tray of cores for the bell ends.

62 per cent greater elongation or ductility. Pieces of the pipe material were readily cut from the super-product "as cast" by means of a hack saw, showing it possessed the easy machining properties of gray iron before annealing. Easy cutting with the chisel and ease of reaming were also exemplified. The Shore hardness of the standard pipe was of the order of 70 as cast with the chilled surface, while the new product had a Shore hardness of 30 as it came from the casting machine.

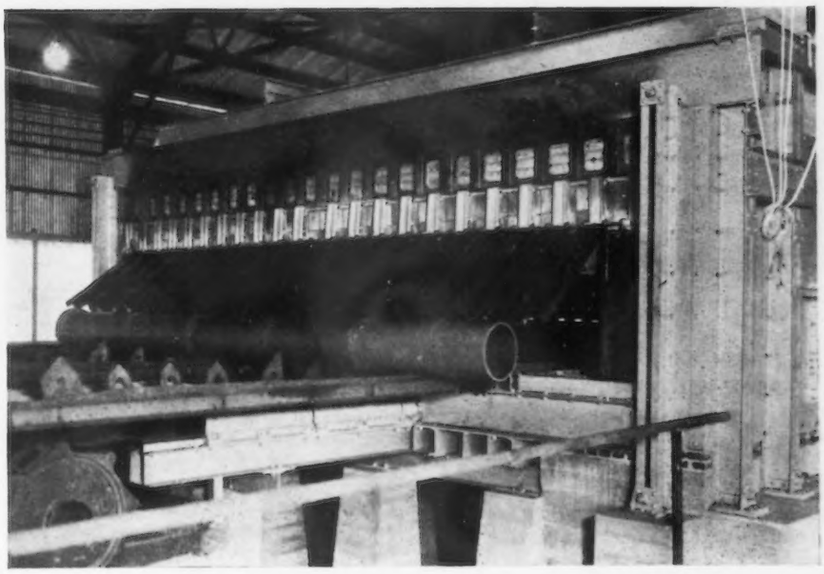
The impact tests were conducted with full lengths of pipe subjected to a maintained water pressure of 65 lb. per sq. in. A 50-lb. hammer was dropped on the pipe in the middle of a 24-in. span. The weight was dropped first from a distance of 6 in. and the distance was then successively increased by increments of 2 in. The height was recorded when the first signs of cracking appeared, then the height when a leak became noticeable and finally the height when there was sufficient opening for a spurting of water, a condition designated as failure.

The results of some tests with 6-in. pipe were in part as follows: With the standard deLavaud pipe, unannealed, failure occurred with a drop of 1.16 ft. The standard pipe annealed required drops of 1.83 ft. to bring failure. The super-deLavaud unannealed did not fail until a height of 1.88 ft. was reached, while the super-product annealed did not show failure until the drop was 3.94 ft. In the case of the standard pipe, when cracking began, it was generally a single hair line developing rather rapidly in opposite directions from the point of the hammer blows. With the super-product there was a group of short cracks more or less irregularly radial from the point receiving the hammer blows.

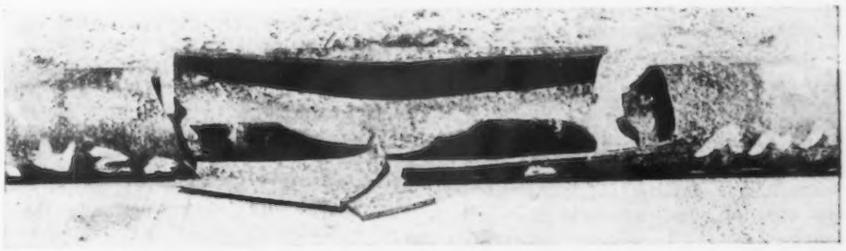
The super-deLavaud unit that has been installed at the Bessemer works replaces a portion of a pit-cast pipe turntable shop originally built in 1915. The original sand-cast shop was equipped for the manufacture of 4 and 6-in. pipe in 12-ft. lengths, as well as 5-meter lengths. The new unit consists of four 4 to 12-in. and one 14 to 24-in. super-deLavaud machines for the manufacture of pipe with 18 ft. laying length.

The unusual height of the basement of the original shop permitted of housing all of the piping systems and afforded excellent access to all parts of the five super-deLavaud machines. The piping systems comprise air, steam and low and high pressure water.

(*Concluded on Page* 66)



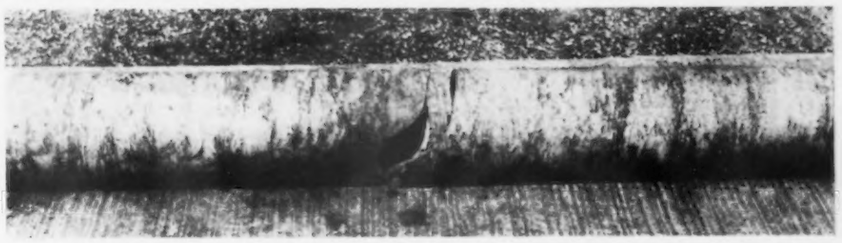
Chain conveyors bring the pipe positively through the annealing furnace, of which this picture shows the discharging end. The rate of transit and the temperature are subject to close control.

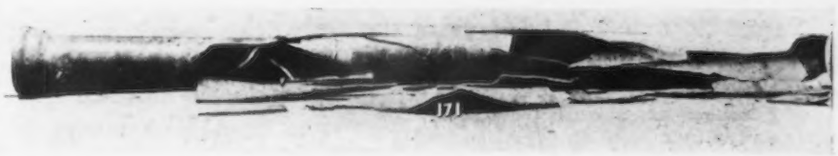


—A—

Two 6-in. pipes tested to failure by a 250-lb. hammer on a 7-ft. span: A shows the standard deLavaud pipe, and B, the Super deLavaud pipe.

—B—





—C—

Two 8-in. pipes tested to failure by internal water pressure: C, the standard deLavaud pipe, and D, the Super deLavaud pipe.

—D—

▲ ▲ ▲ New Things in Materials

Another Non-Metallic Competitor for Metals

MORE competition for metals and alloys is offered by a comparatively new non-metallic material called "Haveg." It is claimed to possess an unusual combination of advantageous chemical and physical properties. An imposing display of it in various forms at the Chemical Exposition in New York in December impressed me as backing up many of the claims for it.

Haveg is made by combining a specially selected asbestos base with a phenol-formaldehyde type of resin. The high acid-resisting properties of this resin, combined with the acid resistance of the asbestos, provide a material which, it is claimed, is completely acid resistant throughout. Chemicals, water or oil do not penetrate it nor destroy the base, as in the case of some products in which non-acid-resisting cellulose materials have been used as a base. Worthy of note is the resistance which this new material offers to hydrochloric acid under any conditions of temperature and concentration. Haveg is reported to be in successful use in plants where hydrochloric acid is a necessary reagent and where heretofore sulphuric acid had to be used. Only one metal alloy has thus far been developed which will withstand hydrochloric acid corrosion.

This new material is light, its specific gravity being 1.6, or one-fifth the weight of iron. It presents no difficulties in transportation and handling. It stands blows and shocks exceptionally well and does not chip or fracture easily. Its compressive strength is about 10,400 lb. per sq. in. and its bending strength is 5600 lb. per. sq. in. It can be used up to 130 deg. C. (265 deg. F.) without ill effect from continued use at such temperatures and is indifferent to rapid temperature changes. It machines well in cutting, drilling, sawing, turning, etc., and can be easily altered, it is claimed. Tanks and other equipment, damaged in transit or by accidents in operation so as to produce holes or fractures, may be refilled with Haveg.

By a special molding process, Haveg can be formed into pipe, tanks, kneading and mixing machines, crystallizing dishes or trays, ventilators, absorption towers, distillation apparatus and in general in applications calling for resistance to chemical corrosion. This new material, manufactured by a Delaware company, originated in Germany.

• • •

That New Metal Ingot Mold

IN these comments in THE IRON AGE of Aug. 24, 1933, attention was called to the development of a new metal mold for ingots from the use of which some unusual benefits are expected. Among the claims is a smoother surface of the ingot lessening the necessity for chipping, a smoother bottom at the base of the ingot decidedly reducing the amount of discard, more rapid cooling due to heat conductivity of the metal mold, and longer life.

It may now be stated that the metal of which the new ingot mold is made is copper. The benefits from its use are expected to offset the increased cost over an iron mold.

Some testimony from Germany on this subject is of value at this time. Two investigators conducted comparative tests on 440-lb. ingots of plain carbon and alloy steels poured in water-cooled copper molds and in ordinary gray iron molds. Segregation zones in the copper cast ingots varied less in width from top to bottom of the ingot than in normal ingots. The ingot surface from copper molds was better so that "chipping waste can be reduced." Copper molds have long life, say the investigators.

Results of extensive experiments with copper ingot molds in this country are not yet available.

• • •

Claims for an Italian Open-Hearth Furnace

THE Terni open-hearth furnace is attracting considerable attention in Europe. It is a development of the Terni Co. of Italy, which specializes in the manufacture of quality steels and which since 1884 has supplied the Italian Government with armor plate, armor piercing shells, etc. The company operates also hydroelectric power and electrochemical plants in the environs of Rome.

The principal feature of the Terni furnace is "an improvement in the air and fuel ports so as to vary the nature and intensity of combustion during the various phases of the open-hearth process." A large number of types of combustion chambers have been constructed, featuring a mixing of the fuel and air before they enter the body of the furnace. The furnace, in a word, uses a special mixing chamber for burning the fuels rapidly, developing a very hot flame, and effecting also gradual combustion with a radiating flame, the latter for the decarburizing and refining periods.

Some of the results claimed are: Furnace life increased 30 to 50 per cent; production increased 40 to 60 per cent; man power reduced 5 to 15 per cent; refractories per gross ton of ingot range from 26 to 33 lb. (inclusive of full rebuilding); and increased capacity and output per sq. ft. of bath. Some 34 furnaces of this type are reported in active operation in several European countries including Italy.

• • •

Vitalium—A New Alloy

VITALIUM is the name of a new metal alloy which has interesting properties. Its use, however, is confined to dental applications. It is an alloy of cobalt, tungsten and chromium. A large dental laboratory in New York has the exclusive distribution of this material out of which plates and other dental appliances are being successfully made.

It is claimed that this alloy is particularly non-corrosive to the action of food acids. It has unusual strength and elasticity and is quite wear-resistant, even more so than the gold alloys. When polished it has beauty and brilliancy. To obtain it in the form desired, a unique mold is used and the molten metal is cast by centrifugal action.

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Sponge Iron and Powder Metallurgy

NUMEROUS references to powder metallurgy have appeared recently in the technical press. The possibilities of this type of metallurgy are important in certain applications, and doubtless more will be heard of it in the future.

Its application to sponge iron is being strongly advocated by a leading investigator in this field in this country. The writer has been shown some remarkable products claimed to

and Processes ▲ ▲ ▲

By EDWIN F. CONE

be commercially possible from the use of powdered sponge iron. By forming this powdered iron into definite shapes and applying heat, a uniform solid product is obtainable having marked physical properties. It is stated that one large automobile manufacturer is using sponge iron to produce parts.

In this connection, it is interesting to note that imports of Swedish sponge iron last year showed notable gains. To Dec. 1, 1933, total importations in 1933 were 619 gross tons comparing with only 185 tons in 1932 and with 210 tons in 1931. The use of sponge iron as a raw material in the production of high grade steels is on the increase.

• • •

Less Time for Carburizing

SHORTENING heat-treating and other time-consuming operations is one of the marked tendencies of the times. A large company in Detroit has perfected a novel method for reducing the time required to carburize rear axle pinions. Briefly the equipment and method are as follows:

A group of small cylinders of stainless steel in the form of Resistal No. 4 is prepared and these are welded together by means of connecting strips of steel so that a set of 6, 8 or 10 are easily transferred from place to place or furnace to furnace; each cylinder will hold one axle pinion together with the carburizing compound.

Placing these sets of cylinders in a furnace, the carburizing is accomplished in much less time than by older methods. The thin cylinders are a factor in reducing the time. They can be used over and over because of their heat resistance and their life is long. The company using this process and equipment is having marked success with it.

• • •

"Eternalloy" for Burial Caskets

"ETERNALLOY" is the name recently given to a new application of cast iron—in the form of seamless caskets. A large maker of radiators is offering a high grade of cast iron as an ideal corrosion resistant material for burial caskets under this trade name. The iron is cast in a seamless casket body with a seamless lid and hermetically sealed. When buried below the ground frost line, this special iron will remain practically forever in good condition and afford perpetual protection.

For many years cast iron caskets have been in use. They were employed during the greater part of the nineteenth century. One exhumed at Salem, Ohio, recently was made probably in 1854 by Crane, Breed & Co. of Cincinnati. Other companies made the Fisk iron casket about the same time. In 1869 W. M. Raymond & Co., New York, described its casket of cast iron in a circular, stating that Henry Clay, Daniel Webster and John C. Calhoun, among others, were buried in them. This particular type of casket was made with an over-shutting flange to make a closer fitting and a more easily cemented joint than the tongue or groove flange formerly used. One iron casket found at Henderson, Ky., had been buried over 113 years and another at Covington, Ky., had been in the ground for 75 years.

Improvements in modern gray iron metallurgy enable the producer to make a satisfactory product at moderate cost that is light as well as strong.

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Electroplating Germanium

ANOTHER metal which can be electrodeposited or plated has been added to the already long list of well-known and rare metals. It is germanium. It can be deposited electrolytically from strong aqueous potassium hydrate solutions of the dioxide. An exposition of the technique of the deposition of germanium will be given in a paper before the Electrochemical Society at Asheville, N. C., April 26 to 28.

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Some Cu-Mo Steels

ANNOUNCEMENT has been made recently of the development of two alloy steels containing copper and molybdenum.

From Germany comes the information that a Cu-Mo steel has been produced which possesses high strength at elevated temperatures. Its composition is:

Carbon	0.14 per cent
Copper	0.20 per cent
Molybdenum	0.27 per cent

At room temperature its tensile strength is reported as 40,000 lb. per sq. in. At 400 deg. F. the value is about 36,000 lb. per sq. in., at 750 deg. F., it is about 30,000 lb., and at 930 deg. F., it is about 26,000 lb.

In Great Britain a British company has made a steel similar to the German product, and claims for it a creep limit at 750 deg. F., twice that of a plain mild carbon steel and that at 930 deg. F. its creep limit is at least three times that of the latter.

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More About Rustless Steels

AT the fall meeting of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers during the National Metal Congress in Detroit last October, a highly valuable paper was presented on "Titanium and Columbium in Plain High-Chromium Steels" by Dr. F. M. Becket and Russell Franks, of the Union Carbide & Carbon Corpn., New York. A review of this paper was published in THE IRON AGE, Oct. 26, 1933. Its presentation created wide interest.

The same authors are to deliver a paper on the effect of these same alloying elements on the nickel-chromium steels at the annual meeting of the same organization in February in New York. This will be greeted with keen interest, as titanium and columbium in the rustless steels give promise to solve several trying and vital problems in the industrial application of heat and corrosion resisting steels.

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"Improvite" for Iron Castings

THE production of a close-grained, pressure tight casting is claimed possible by the addition of a new material to gray iron castings. This material is offered under the trade name "Improvite," containing about 67 per cent nickel and the rest graphitizing elements which tend to decompose cementite into graphite and pearlite. The resulting product is said to have a high tensile strength and to be readily machinable.

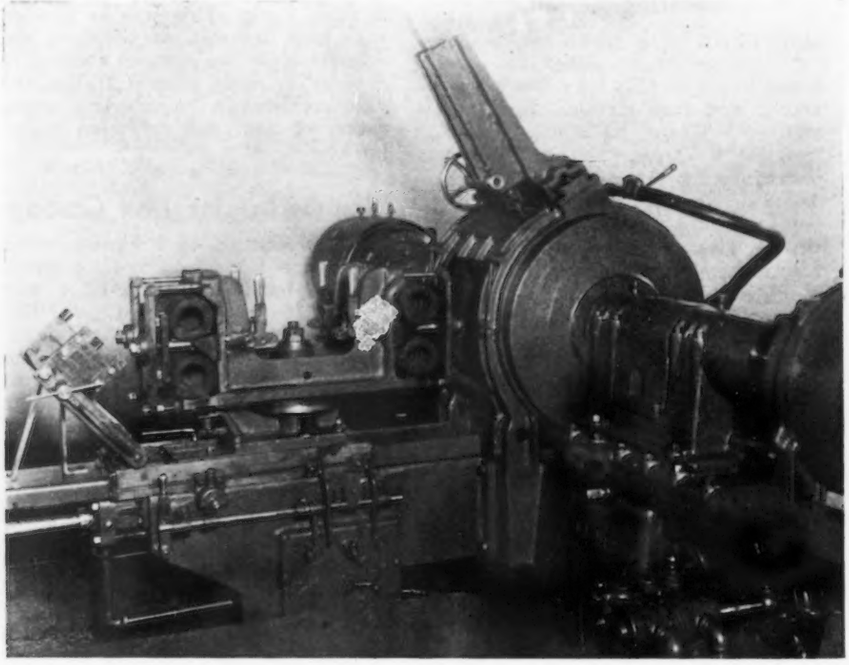
The quantity of Improvite to be added is regulated by the type of casting to be made as well as its composition. In general, the addition of about one per cent is said to give good results. The new material is available in shot form which can be added to the ladle or the stream. For additions to the cupola, it is obtainable in ingot form.

Grinding Springs for New Front Wheel Suspensions

THE latest major development in motor car manufacture—the new type of independent spring suspension used on the front end of many 1934 models—has attracted great general interest. This radical departure from the accepted construction, displayed at the recent automobile shows, marks the first breaking away from the semi-elliptic spring suspension which has been standard for so many years.

The large coil springs now used by certain manufacturers must be ground on both ends to insure parallelism, and a flat seat over 75 per cent of the area of each end. It is furthermore required that the ground ends be held within one-half degree for squareness with the axis.

The large double-spindle grinder illustrated, built by the Gardner Machine Co., Beloit, Wis., is representative of those which have been furnished to several automobile plants. They are equipped with large diameter grinding wheels (generally 26 in. or 30 in.), and are provided with a hydraulically-operated, oscillating knee upon which is mounted an indexing type of fixture. Each end of the fixture carries a number of springs (either 2 or 4, depending upon size, and production requirements), and while one end is oscillating between the grinding members, the operator unloads and reloads the other end. During the oscillation of the work, the two grinding wheels gradually close in upon it, until the springs are ground to a predetermined length. This in-feed on the heads is not a continuous travel, but rather they are caused to close in a few thousandths with each oscillation of the work between the abrasives. Operation of the oscillating knee is fully automatic, and the entire grinding process is thus practically continuous.



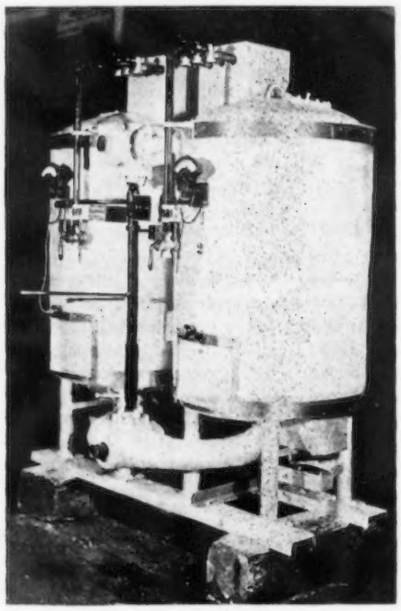
Large double-spindle Gardner grinder for grinding coil springs for automobile front wheels. From two to four springs are carried at each end of the indexing fixture, which is mounted on a hydraulically-operated oscillating knee.

Dries Air or Gas By Activated Alumina

TO supply air or gases with a humidity content much below the normal, a new industrial instrument that has been given the test of use is announced by the Pittsburgh Lectrodryer Corpn., Pittsburgh, a company associated with the Pittsburgh Lectromelt Furnace Corpn. The device is known as the Lectrodryer. It employs the principle of adsorption, or adhesion of the molecules of gases or dissolved substances to the surface of a solid body. For the solid body the company uses what is known as activated alumina, a recent development of the Aluminum Co. of America.

The field of use of the dryer is that broadening one in many chemical and technological processes in which refinement and dependability of product call for utmost control to prevent irregularities growing out of variable weather conditions. It has been applied, for example, in connection with the controlled atmosphere procedure of bright annealing and for preventing precipitation of moisture in storage rooms.

The Lectrodryer may be described as a small tower for connection directly to an air or gas line and provides for the continuous delivery of dried air or gas. The towers are built



in single or double units, one adsorbing while the other is undergoing reactivation. The shift of a lever once or twice a day serves to cut the adsorbers in and out of service. For reactivation, either electric operation or fuel firing may be arranged. Dryers are rated for 500, 2500, 6000 and 10,000 cu. ft. of air or gas per hour. The smallest has a flow rate of 100 cu. ft. an hour and is reactivated by plugging into a convenient 110-volt light socket; it is of aluminum construction so that it is portable.

Dryness that is equivalent to dew points of 50 to 60 deg. C. below freezing (—58 to —76 deg. F.) are claimed to be regularly obtained in commercial installations. It also is said that lower dew points are attainable. While the equipment is employed essentially for dehumidification, arrangement may be made for temperature control of the gas dried. The dryer is also designed for operation at high pressures, say, 125 lb. per sq. in.

STAR drills of four-point type have been added to the line of tools offered by the Armstrong Bros. Tool Co., Chicago. They are made of drop forged high-carbon chisel steel, hardened and tempered, and finished in black baked enamel. Drills from 8 to 24 in. in diameter are made in diameters from ¼ to 1 in., by sixteenths. Larger diameters, from 1 to 1½ in., by eighths, are made in 12, 18 and 24-in. lengths.

Introduces New Pantograph-Type Gas Cutting Machines

THE AIR REDUCTION SALES CO., 60 East Forty-second Street, New York, has added to its line of pantograph-type gas cutting machines two new units, designated as the Airco-DB No. 7 Oxygraph and the Airco-DB No. 1 Travograph respectively which greatly enlarge the range and scope of machine gas cutting.

The basic principle of operation is the same as that of the Airco-DB No. 6 Oxygraph, previously introduced. The No. 7 Oxygraph, however, employs a different pantograph construction, the fourth side of the parallelogram being removed to the rear. This arrangement allows the working ends of the arms to swing between the vertical posts which support the pantograph assembly, as well as in back of them, and permits the covering of a maximum cutting area with a given length of arms.

The No. 7 Oxygraph has no tracer bar, the tracer being attached to the end of one pantograph arm and the cutting torch to the end of the other arm. It is designed for single torch operation only. In this machine the tracing table for holding the full-scale drawing is part of the machine and is located on top of the bed between the vertical posts. Either a manually-controlled or a magnetic tracer can be used, each, however, requiring its respective adapter. The manually-controlled tracer unit with its adapter is supplied as standard equipment. When using the magnetic tracer, cams are mounted overhead, attached to the substantial shank with nut located on top of each vertical post.

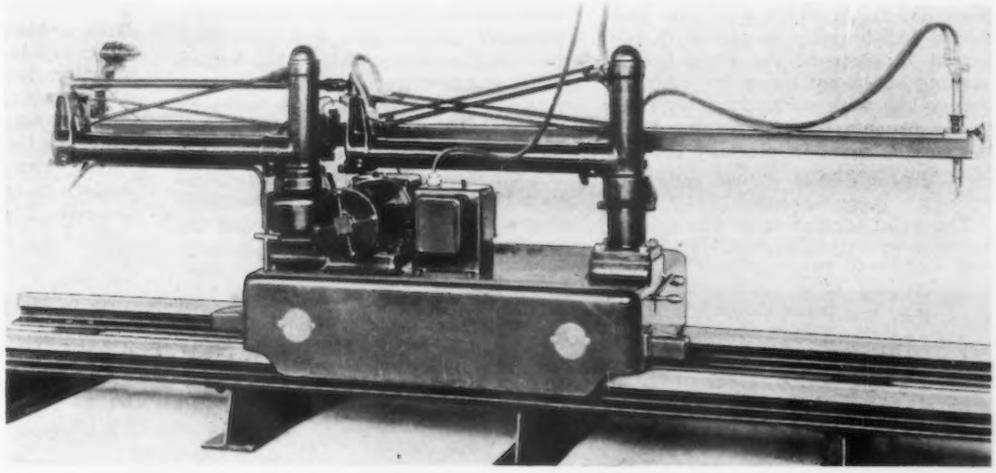
In the case of the No. 1 Travograph, the pantograph assembly is mounted on a carrier that travels on rails, which makes possible a greatly extended cutting area as compared with the No. 6 Oxygraph, in which the pantograph assembly is mounted on a heavy stationary base. Similar to the No. 6 Oxygraph the No. 1 Travograph is fitted with a long tracer bar, attached to the outer ends of the pantograph arms. The tracer mechanism and cutting-torch holders are mounted on this bar and may be moved to any position along the bar and secured in place by set screws. As many as six cutting torches may be mounted on the bar for multiple cutting. Being mounted on the same bar, the cutting torches conform closely to the movement of the tracer.

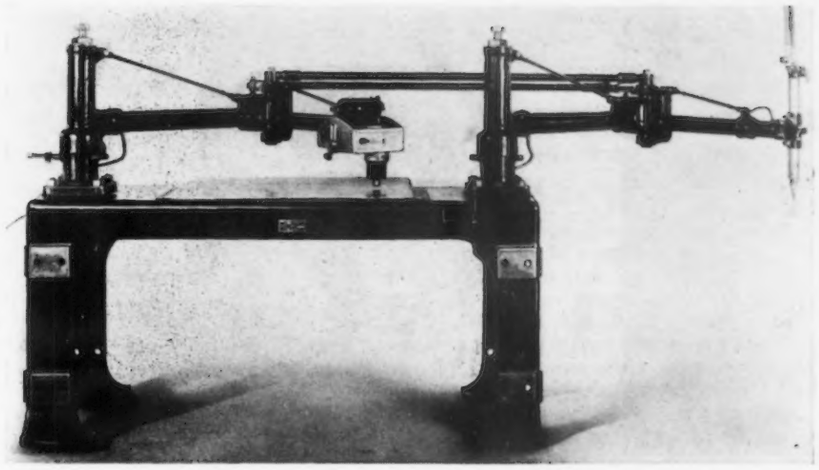
The Travograph can also be operated with either manually-controlled or magnetic tracer. The cams used with the latter are mounted on the tracing table of this machine.

In operating the Travograph, the pantograph assembly is first swung by hand, to bring the tracer wheel and torch to the starting point of the cut, the tracer is lowered until its full weight rests on the table, the torch is adjusted to the proper height above the work, and then the driving motor is started. The operator then guides the tracer along the lines of the drawing until the cut is completed.

Automatic control of the carrier driving motor by the movement of the pantograph arms is a feature of this machine. As these arms reach certain limiting positions in their swing in either direction, they operate switches which actuate the magnetic reversing starter of the carrier motor. In this way the carrier is automatically positioned to the most advantageous location at all times. The position of the tracing device, its speed and direction of travel automatically control the direction and extent of travel of the carrier.

The pantograph assembly on both the No. 7 Oxygraph and the No. 1 Travograph have arms of rugged proportions, adequately braced for maximum strength and rigidity under load. Hinge fittings likewise are amply proportioned. All bearing surfaces are of large area and accurately machined. The bearings which mount the assembly at the vertical posts, and all hinged joints, are equipped with large diameter ball bearings, designed for both thrust and radial loads. This





The Travograph gas cutting machine at right has a pantograph assembly that travels on rails, an arrangement that greatly extends the cutting area. The new Oxygraph, shown below, employs a different pantograph construction, the fourth side of the parallelogram being removed to the rear.

assures smooth, almost frictionless operation.

The carrier of the Travograph is also precision built, and has large wheels with ball-bearing axles for smooth, easy running. The electrical circuit provides for giving the carrier driving motor a slow starting speed and smooth pick-up, thus eliminating any jarring of the tracer bar. At each end of the carrier base a limit switch opens the carrer motor circuit and brings the carrier to a gentle stop. The carrier drive can be disengaged by a clutch, which permits quick positioning of the carrier along the track. The carrier is adequately counterweighted to offset the leverage of the pantograph with arms fully extended, and safety hooks preclude any possibility of accidental tipping.

The rails on which the carrier runs are specially rolled tie sections, 16 ft. long, with tops or treads accurately machined. They are bolted to five large H-beam sections which serve as ties and supports for the machine. Additional 16-ft. lengths may be added if required.

Both the manually controlled and magnetic tracers for No. 7 Oxygraph and No. 1 Travograph are equipped with variable-speed motors, which permit the cutting speed to be regulated by merely turning a speed governor screw on the motor.

Straight lines, circles and regular and irregular shapes are cut in steel plate, slabs, billets and forgings by both of these machines.

The cutting area or range of the No. 7 Oxygraph is a 30 in. square or a 36 in. diameter circle, while that of the No. 1 Travograph is a rectangle 4½ ft. in width and 11 ft. in length with one 16-ft. section, or any length desired with additional rail sections.

The wheel guard has been modified so that it may be readily removed after loosening but one knurled nut. This is particularly advantageous where both cemented carbide and high-speed steel tools are ground on the same machine, because it permits rapid interchange of the grinding wheels. The motor is now mounted on the side of the machine instead of on a base plate, and is arranged with convenient adjustment for belt tension. Although heavier and more substantial than the older model, the new machine requires less floor space.

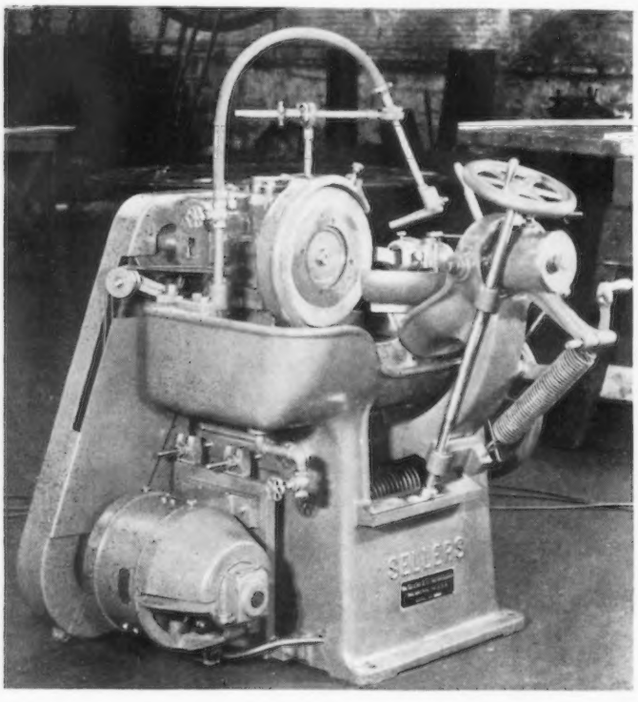
Redesigned Tool Grinder Suitable for Carbides

TO meet the exacting requirements for grinding cemented-carbide tools, William Sellers & Co., Philadelphia, is offering the completely redesigned tool grinder illustrated, which is designated as the No. 2A.

An important change is the spindle construction, in which a special preloaded ball-bearing mounting is employed in place of the plain bronze bushing of the earlier model. Also, a V-type belt with pulley mounted close to the bearings is now employed for the spindle drive in place of the flat belt and overhung pulley formerly used.

The axial oscillation of the spindle has been greatly improved. The spindle with its preloaded ball bearings is now mounted in a large bronze sleeve, which is oscillated axially by a protected cam revolving at a fixed speed. A heavy coiled spring keeps the sleeve and cam in positive contact.

The entire grinding head has been designed for lubrication by a high-pressure grease gun system, which not only provides better lubrication but keeps abrasive dust from working into the bearings. Backlash has been eliminated from the feed screw that actuates the in-and-out movement of the chuck; this has been accomplished by a heavy spring which assures positive contact between the nut and the screw.



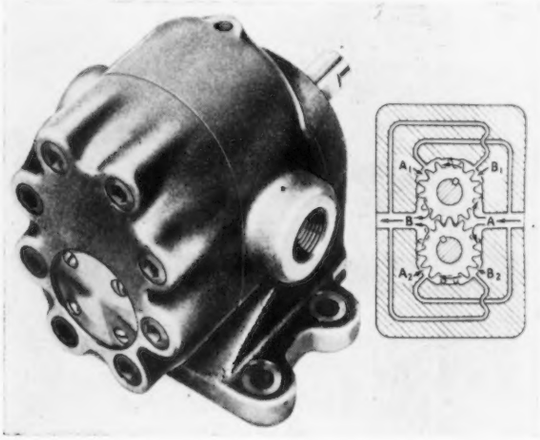
Ball-bearing spindle mounting is one feature of the new Sellers tool grinder.

Balanced Gear Pump and Fluid Motor

HYDRAULIC balancing features the gear pump and fluid motor illustrated, a new product of Vickers, Inc, Detroit.

The balancing principle incorporated is illustrated in the schematic drawing herewith. Adjacent to the gears and diametrically opposite the inlet chamber, A, are balancing members A_1 and A_2 which are connected to A and are open to its pressure. Similarly, balancing chambers B_1 and B_2 are connected to outlet chamber B and are open to its pressure. It is stated that thus each gear is always in hydraulic balance, and thrust loads, with consequent wear on bearings, gears and housing, are eliminated. The result is longer life, higher efficiency and greater operating pressure. Even more important, perhaps, is that the unit, used either as a pump or as a motor, cannot bind or lock. As a motor, it can be started under full pressure and it has full torque when stalled. Any unit may be used as pump or motor, and rotation is reversible without internal change.

It is stated that for the past two years this unit has been used as a motor to drive drills, grinding spindles, etc., and that as a pump it has operated at pressures up to 1500 lb. per sq. in.



With the hydraulic balance, wear on bearings, gears and housings is said to be eliminated. Furthermore, the pump or motor cannot bind or lock.

Trade Commission Regains the Limelight—

Much Ado About Steel Prices and Basing Points

By G. L. LACHER
Managing Editor, The Iron Age

A UNITED STATES Senate resolution calls upon the Federal Trade Commission to investigate and report on price fixing under the steel code. The investigation is expected to bring to light the commission's recent report, heretofore withheld from publication, condemning the basing point system in vogue in the steel industry. The authorizing resolution was prompted, it is said, by country-wide complaints of discrimination against smaller business men and consumers through alleged price fixing and monopolistic practices.

Although, on the surface, this development seems to have the laudable purpose of looking out for the interests of the little fellow, any one familiar with the iron and steel industry recognizes it as another political play to the galleries and, as such, likely to create needless disturbance and confusion. There have doubtless been complaints regarding iron and steel prices—some of them because of the disappearance of old preferences, others merely because prices have advanced—but such complaints are not prima facie evidence of price fixing. The open price policy put into effect by the steel code is by no means identical with price fixing. This policy requires that all price reductions be filed with the American Iron and Steel Institute 10 days before they go into effect. In other words, secret price chiseling, which had thoroughly demoralized the market prior to the adoption of the code, has been banned.

This is the full extent of the industry's control over prices under the code. It is simply a policy of open bids openly arrived at and in no way contravenes the anti-trust laws.

Higher Costs Beget Higher Prices

The fact that the trend of prices has been upward since the code was adopted is not hard to understand in view of the sharp increases in costs that have been imposed on all producers by the New Deal. From June, 1933, the first month for which steel company payrolls were compiled in connection with the code, to November, the latest month for which figures are available, mill wage costs increased 70 per cent.

Even the man on the street knows that if wage rates are to be raised and employment spread, prices must go up also. He knows likewise that the primary purpose of the industrial recovery act was to put a stop to the twin evil—price chiseling and wage slashing. He recognizes that the NRA was created to accomplish artificially what economic forces failed to bring about naturally.

What the Recovery Act Says About the Anti-Trust Laws

To make that result more certain the recovery act partially suspended the anti-trust laws. Although the act prohibits codes from promoting monopolies or oppressing small enterprises (Sec. 3a), it also stipulates that any action complying with code rules shall be exempt from provisions of the anti-trust laws (Sec. 5).

The open price policy of the steel industry is a part of the steel code, which has been approved by the President. If, in any way, it can be construed as running counter to the anti-trust laws, which is very unlikely, the responsibility rests as much on the Chief Executive as on the signers of the instrument. General Johnson recognizes this fact, being quoted in the press as stating that what was done in pre-code days and what is being done now under Government sanction are different things. When asked whether a business man could be prosecuted for an act that he was permitted to perform under the code, he replied that it would be difficult to get a conviction on anything that had been approved by the President.

Basing Point vs. F.O.B. Mill Prices

But entirely aside from the industry's liability to prosecution, it is conceivable that the Federal Trade Commission, a Government agency, might persuade the Administration of the desirability of amending the steel code so as to eliminate basing points. In its famous "cease and desist" order in the Pittsburgh plus case, the commission banned sales "on any other basing point than that where the products are manufactured or from which they are shipped." It also prohibited discrimination between different purchasers of the same product, "where the effect may be to substantially lessen competition in any line of interstate commerce."

Now if the Trade Commission has in mind an f.o.b. mill basis of selling with identical prices to all purchasers, it is proposing a scheme which would revolutionize market practices but not necessarily to the advantage of the buyer. To get a better picture of how such a mode of selling would affect the industry, a recent rail order may be cited. The railroad, which wished to divide the tonnage equally between two producers, was prevented from doing so by the transportation coordinator, who insisted that the rails be bought from the nearest producer. In other words, the other rail mill was barred from absorbing the freight advantage enjoyed by its competitor.

Would Divide Country Into Tight Compartments

If such a system were enforced for all products, orders for steel would automatically go to the mills that were nearest in terms of freight rates. The country would be cut up into tight compartments, each served by its own producing center, and the flow of business from one compartment to another would be entirely cut off. Such an inflexible arrangement would tend to reduce competition rather than to increase it, since producers in a given zone would not have to fear sales by outsiders. It would also tend to penalize centers producing a surplus of steel, since the only way they could reach wider markets would be to make a flat reduction in base prices applicable to all buyers whether nearby or distant.

Theoretically, this would be equitable. Practically, it wouldn't work out. Business activity is rarely evenly distributed throughout the country and it is frequently desirable in the interests of economical operations to absorb freight in order to obtain tonnage from another district. Such an incursion into another territory has an equalizing effect, since it prevents mills serving an active district from advancing their prices un-

duly. The practice really works out to the advantage of the buyer in the end.

More Than 200 Basing Points in Existence

The basing point system, as it exists today, is essentially a compromise between the f.o.b. mill plan recommended by the commission and the practical demands of business. It is in no sense a perpetuation of Pittsburgh plus, under which mills distant from Pittsburgh quoted prices equal to the Pittsburgh base plus the phantom freight. Under the code there are more than 200 basing points scattered throughout the country. In some cases basing point prices are equal and in some cases they vary, but in no case is a base price equal to the Pittsburgh base plus the freight.

Producers outside of Pittsburgh protect themselves from Pittsburgh competition to the extent that they force mills in that center to absorb freight. Chicago producers, for example, recently reduced their prices on plates, shapes and bars to within $1 a ton of the base prices at Pittsburgh and there is now talk of entirely eliminating the differential. If this is done, Pittsburgh mills will not be able to compete in Chicago without absorbing the full freight rate to that city.

A Tariff But Not an Embargo

In other words, outside centers protect their markets to the extent that competitive conditions warrant by lowering their base prices toward those prevailing in the district with the largest surplus of production. But, though the freight disadvantage imposed on Pittsburgh is equivalent to a tariff, it is not an embargo, as it would be if Pittsburgh mills were prohibited from invading other markets.

The Federal Trade Commission may argue that there is nothing to prevent Pittsburgh producers from reducing f.o.b. mill prices to such a low level that they could reach other districts. Assuming that this were possible, it would restore the condition which the Trade Commission fought so vigorously, namely Pittsburgh plus. Districts now having their own basing points would be forced to pay prices equal to the Pittsburgh mill base plus the full freight.

The Trade Commission's alarm about the basing point system is prompted either by ignorance or a desire to get back into the limelight. While there may be certain inequities in the system as it now exists, these will no doubt be removed as they are brought to the attention of the commercial committee of the American Iron and Steel Institute. To scrap the system and adopt a strict f.o.b. mill basis of selling would disrupt established market practices, raise operating costs, increase the irregularity of employment, and lift, rather than depress, the average prices paid by consumers.

The new outcry against basing points and price fixing can be summed up as "much ado about nothing." Unfortunately it may force the steel industry to expend time and money, which might better be devoted to the cause of recovery, to educate the uninformed. While startling disclosures of the practices of bankers and financial manipulators during the past year have caused the public to believe the worst about everything, there is a sharp distinction between business and speculative finance. The iron and steel industry has nothing to conceal.

Auto Makers Scout Green's Charges of Code Violation

ALTHOUGH they refuse to dignify with a public answer William A. Green's charges that they are violating the automobile code in wholesale fashion, motor car manufacturers privately brand them as part of the propaganda campaign being conducted by the American Federation of Labor in behalf of unionization of the automobile industry. They say that no company would be so stupid as to try to get around the 48-hr. maximum work week by paying its men by check for the maximum legal time and in cash for overtime as Mr. Green asserted. There may have been violations of the maximum working hours in isolated cases because of the unfamiliarity of minor production executives with the code but they have been insignificant in number and have been reported to the code authority.

Labor officials charge that there is no real shortage of skilled workers in Detroit as reported by car manufacturers. They attribute talk about a so-called shortage to the fact that employers have refused to rehire skilled men who are members of the Auto Workers Union. They likewise declare that factories in this district are not calling back former semi-skilled employees who have become affiliated with the United Auto Workers union. William Collins, representative at Detroit of the American Federation of Labor, points out that the average number of work hours per week in the automobile industry was increased recently from 35 to 40 by the NRA Administration to avoid the necessity of importing thousands of workers into Southern Michigan to meet seasonal production demands and then leaving them stranded without jobs after the rush was over. Despite this fact motor car makers today are recruiting labor outside Michigan, states Mr. Collins.

A leading automobile executive calls attention to the general terms in which Mr. Green couched his charges. Federation officials reply that specific evidence in the form of affidavits supporting the charges already are in the hands of the NRA Compliance Board in Washington. The American Federation of Labor now has 30 local automobile unions chartered in metropolitan Detroit.

AUTOMOTIVE EMPLOYMENT

	Now	One Year Ago
Metropolitan Detroit.....	245,000	170,000
Ford Motor Co.:		
All U. S. plants.....	90,000	*
Dearborn and Highland Park	46,000	*
General Motors Corpn...	158,000	125,000
Chevrolet Motor Co.....	50,816	31,000
Chrysler Corpn.....	43,000	22,000

*Figures not available, but present employment represents large increase over that of a year ago.

Mechanical Engineers Survey Industrial Outlook

A SURVEY of capital goods industries, to ascertain the prospects of revival of activity, was undertaken late last year by a special committee of the American Society of Mechanical Engineers. Industrial establishments in Philadelphia, Worcester, Atlanta, St. Louis and Milwaukee were reached with a questionnaire calculated to throw some light on the possibility of an expansion and the return to employment of the large numbers not as yet affected by the betterment in consumer channels. The five cities were selected to get a wide distribution and in each of them a variety of industries was covered.

Essentially the same attitudes and points of view were reported from all five industrial centers. While two-thirds, or 112 of the total of 169 replies tabulated, owned to being optimistic with regard to the business outlook, 115 had no definite plans for modernization of equipment and 94 did not expect to make a capital investment. All save five out of a total of 151 companies reported increases in production costs owing to the codes of fair practice, ranging from 8 to as high as 100 per cent; and 68 out of 92 said that prices had not been raised sufficiently to meet the increase in production costs.

Sidelights on the Automobile-Steel Controversy

By BURNHAM FINNEY
Detroit Editor, The Iron Age

THE action of the Chevrolet Motor Co. in reducing its steel allotments to the major steel companies and spreading out its requirements over a large number of small mills, in an effort to "spank" the leading interests for their part in putting certain provisions into the steel code and in raising steel prices, brings to the surface a controversy which has been raging under cover for months.

The dispute has many ramifications, such as the privileged position of the automobile industry as the most important buyer of steel, the troublesome matter of water vs. truck vs. rail shipments of steel from mills to consuming points, increased costs under the NRA, the necessity for putting the country's largest basic industry on a solid financial basis, the disputed question of basing points for determining steel prices, and whether the motor car people have sound reasons for adopting punitive measures against steel companies.

It will be recalled that automobile manufacturers protested vigorously against the refusal of the steel industry to grant them preferential prices when the steel code was formulated. One of the leading automotive purchasing agents regards motor car builders as the sales outlet for steel, being the agency whereby steel is fabricated and put into the hands of the ultimate consumer. In that position the automobile industry spends millions of dollars every year to sell cars, which average at least a ton of steel per car. No other steel user is so vigorous or successful a sales agency for steel. "Isn't that proof that automobile companies should get a better price than the small shop which uses a carload of steel now and then?" asks this official.

The argument runs a step further. The steel industry, like any other industry, is entitled to a reasonable profit. Admittedly it lost money during the depression, but so did every other industry, including the automobile industry (with one or two notable exceptions). It was entitled to an increase in prices for its products, but not to the extent of trying to recoup its losses in the past four years in one fell swoop. Undoubtedly the industry was honeycombed with bad practices in the form of various kinds of price concessions, direct and indirect, but the NRA should not be used as an instrument to achieve a monopolistic condition. After all, consumers have some rights, and if delivered steel prices are raised excessively, the purposes of NRA to broaden purchasing power and reenergize buying will be defeated. If automobile retail prices are forced to levels too far above those of last year, retail demand is likely to be seriously curtailed. This would be a calamity not only for the automobile industry, but for the steel industry.

Object to "Extras"

Certain automobile executives go so far as to accuse steel companies in some instances of resurrecting "extras" no longer justified by modern manufacturing methods. In other words, they assert that steel is charging all that the traffic will bear rather than restricting increases to added labor and materials costs and getting back merely upon a sane and reasonable price basis.

Even this is not the extremity reached by some automobile purchasing officials in their indictment of the steel industry. They declare that if steel companies cannot show a profit today or have not been able to in recent months, their managements are to blame. They haven't been willing to face depression facts and deflate as they should and as leading automobile companies have done. Said one purchasing executive, "If we in the automobile business conducted our activities as the steel people do theirs, we wouldn't have a job long."

Truck and Water Deliveries

Yet this isn't all. The steel industry has deprived automobile makers of the advantage which they formerly possessed of taking delivery of steel at the mill door and transporting it to the fabricating point in their own trucks. They still can do it, but the saving accrues to the steel company and not to them. Some motor car manufacturers have spent large sums for equipment to handle iron and steel deliveries by water, but they are unable to realize the full economies from these investments under the rules now governing the steel trade. This, they say, is an injustice which should be corrected.

It is true that steel makers have set up arbitrary delivered prices in southern Michigan on bars, sheets and strip steel used in large quantities by the automobile industry, thereby granting lower prices than other consumers enjoy. However, claim the motor car companies, this is only a beginning. Why shouldn't a Detroit base be established on these products? Why should the motor car trade put into the pockets of Detroit district mills $3 or $4 a ton which otherwise it would not have to pay out?

There are a number of small but irritating regulations in the steel code, pertaining to such matters as discounts, which have tended further to antagonize automobile companies. At least they have been of no help in smoothing over a ruffled state of mind in Detroit.

What's the Increased Cost?

Let's examine the complaints of the automobile industry and see how legitimate they are. Start with the increased cost of iron and steel in a Chevrolet car, since the Chevrolet company is appearing in the role of steel's chief antagonist. No accurate, indisputable figures are available, but some facts are self-evident.

Less than 500 lb. of cast iron goes into a Chevrolet car. It is understood that practically all of this is made at Saginaw in Chevrolet's own foundry. The melt is reported to be about half pig iron and half scrap. The foundry today has in stock enough pig iron bought at low prices to carry it along until midsummer. A good portion of the scrap consists of sprues, gates and other old material produced by the plant itself. Thus the cost of castings going into the Chevrolet car will not increase to a significant degree until the major portion of the year's output has been turned out. Even then the pig iron cost per car probably will go up only $1 a ton or less. Of course, the increased cost will be more if the 1934 price is compared with the price paid last year by General Motors to a Cleveland steel company for a huge distress tonnage of iron, but since this was a special, one-time transaction, it should not be used for comparison. It would be like taking for a standard of comparison the price paid at a fire sale.

As to steel, it is estimated that there is more than a ton in a Chevrolet car, which weighs over 3100 lb. The automotive trade claims that the increased steel cost amounts to about

$10 a ton, but steel men say that it is nearer $8. To avoid dispute, let's yield a point to the former and call the added cost $10 per car. One should bear in mind that it is doubtful whether Chevrolet will produce a car before Feb. 15 in which the steel cost was more than in 1933 cars, due to the large volume of steel bought prior to the price advance.

If $11 is allowed for increased prices of steel and pig iron ($10 for steel and $1 for pig iron), this sum represents all of the added price burden in the production of the Chevrolet car which can be charged up to the steel industry. Yet the base price at the factory of the Chevrolet car has risen approximately $70. Because of the new policy of selling Chevrolet cars to the public on the basis of delivered prices, the consumer actually pays only an average of $40 more than in 1933.

The New Car Prices

Despite the reduction in the spread between Chevrolet's factory and delivered retail prices, the fact remains that the retail customer is paying a base price $70 higher than a few months ago. Of that total $11 represents increased cost of steel and pig iron, and a small amount, perhaps $5 at the outside, goes for the rise in other materials. About $30 is allotted to extra labor expense under the NRA, according to a statement made by Alfred P. Sloan, Jr., and based on General Motors figures for the month of August, 1933. This added labor expense, however, should be substantially reduced per car with growing volume of manufacture. In fact, William S. Knudsen, executive vice-president of General Motors Corpn., declared several months ago that an increase of approximately 25 per cent in production volume will be necessary to offset increased costs under code operation. Taken literally, this statement would mean that a gain of 25 per cent in volume would put costs under the code at the same level as they were prior to NRA. And the industry, including Chevrolet, is talking now in terms of a three million car year compared with a two million car year in 1933, an improvement of 50 per cent.

With Detroit thinking about 300,000-car months and ready to concede that sizable profits loom for General Motors, one wonders whether all the weeping and gnashing of teeth over steel's dictation to the automobile industry is not partly stage play, now that the shoe which pinches is on Detroit's foot instead of Pittsburgh's. If automobile companies are so gallantly absorbing so many extra costs instead of passing them along to the public, their prospective earnings logically should be in peril. Yet no knowing person in Detroit suspects such a thing. Isn't the burden on the automobile maker's shoulders to prove that the added cost of steel and iron going into a 1934 car exceeds reasonable bounds? No one has stepped forth with facts and figures leading to such conclusion.

Increases to Labor

There is another side of the picture to look at in surveying the $11 increase in steel and iron in the low-price 1934 car. Most of this sum, either directly or indirectly, is paid to labor. An important steel company, for example, has had an increase of $11 a ton in producing full-finished sheets. Of that amount $4 went to labor and $7 to increased prices for materials, but it must be remembered that most of the $7 also found its way into labor's pockets through higher wages to coal and iron mine workers, etc. A goodly portion of increased wages is being spent for automobiles, so that the motor car industry is getting part of its stimulus today from this expanded buying power.

It is apparent that with the volume of business which steel mills have had in recent months the steel industry cannot come within striking distance of a fair and reasonable return on its investment. Perhaps with a considerably higher operating rate, which seems assured for at least the spring months, it can make a more favorable showing. Some companies assert that they can't make any money at present price levels even with full operations. In any event, one would be exceedingly rash to claim that steel mills are certain to make a fair profit at current prices with added volume or that a modest increase in prices for second quarter would yield more than a relatively small profit. The higher prices of steel have been offset in large measure by increased costs for labor and materials, and the day of sizable steel earnings is still far distant. It is hardly necessary to comment on the fact that United States Steel Corpn. in 1933 lost $36,500,000, while General Motors Corpn. had net earnings of $84,000,000.

Disputed Points Open to Argument

At this point one steps over the line from known facts into a disputed realm. On such matters as putting the largest consumers, who give steel mills hundreds of thousands of tons annually, into the same price category as the small user, there is a division of opinion in the steel trade itself, even though this edict has been laid down in the steel code. Many consider that the automobile industry has a legitimate grievance against this policy, as in the denial to it of the full benefit of economies realized from truck and water transportation.

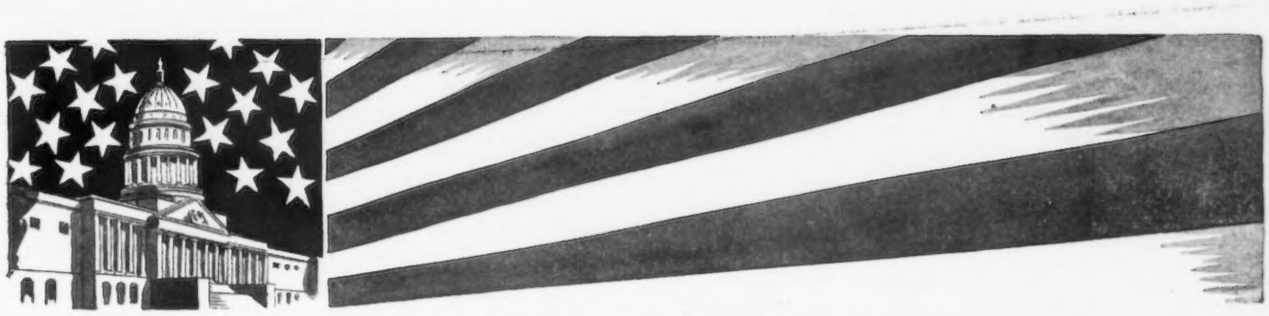
Moreover, the price advantage of concentrating large tonnages in the hands of a relatively few mills has been destroyed by the steel code's provisions. Under the circumstances, Chevrolet scarcely can be criticized if it distributes its tonnage over a larger number of mills. Like one other prominent car manufacturer, it then could say to its dealers in steel-making centers that it is giving business to companies in that district and it can expect support in the form of retail sales of its cars. Thus far General Motors has spurned the so-called "reciprocity" method of selling cars.

One point deserving emphasis is that the production of automotive steels is an exacting task. No other user is so finicky about the kind of steel it must have. No other user has such rigid standards of inspection which must be passed before steel is accepted. This puts a premium on experience and skill in the manufacture of steel for automotive consumption. Can steel mills which have never participated in this business and which perhaps haven't the facilities of some of the larger mills meet these hard specifications at a time when automotive production executives will be "on the spot" to turn out enough cars to satisfy sales departments? This is a question which Detroit now is discussing.

The negotiations of General Motors looking toward the acquisition of the Corrigan-McKinney Steel Co. and its subsidiary, the Newton Steel Co., are believed to be part of a well-planned campaign to curb further steel price advances and possibly to gain concessions now blocked by the steel code or by commercial resolutions. Although Detroit does not consider that General Motors is serious in its intentions to buy Corrigan-McKinney or even to make a working agreement which would include an option to purchase its properties, the steel trade is nervous about what already has happened.

The fact remains that the large steel companies, which Chevrolet charges had voting control in putting into the code objectionable measures aimed at consumers, have felt severely the reduction of tonnages by Chevrolet for at least the remainder of the first quarter. What policy will be pursued for second quarter will be determined by developments in the next 30 days. General Motors declares that it has no intention of going to Washington to make a formal protest against the steel industry. It takes the stand that the steel industry itself placed certain provisions in its code which should not be there and the initiative and responsibility for taking them out rest upon its leaders. Upon their actions in the weeks immediately ahead depends a war or an amicable settlement of difficulties between two mighty industries.

Preliminary report by Acme Steel Co. shows net profit during 1933 of $941,795, equal to $2.75 upon capital shares. This is to be compared with a net profit of $21,340, or 6c. a share for 1932.



THIS WEEK IN WASHINGTON

Industry on Horns of New Dilemma

Code Prices Are Attacked and Administration Broadens Union Powers

By L. W. MOFFETT
Resident Washington Editor
THE IRON AGE

WASHINGTON, Feb. 6.—Outstanding developments in the latest moves of the National Recovery Administration relate to its drive against price fixing in codes, plans for their enforcement, and efforts to broaden the activities of labor toward collective bargaining.

The attack on price fixing clearly has been intensified by criticism in the Senate. Tightening up on code compliance was reflected at the first conference of the 48 newly selected State directors of the National Emergency Council, which will supervise compliance machinery. The Council conference was in session four days, Jan. 31-Feb. 3. Apparent doubt as to the authority of the National Labor Board to impose itself as a supervisory body over elections at industrial plants for purposes of choosing representatives for collective bargaining is believed to be the reason for a new plan to handle this vexatious question. This was seen in the President's executive order permitting employees to take polls outside of plants to determine whether they want to hold an election to choose representatives to collectively bargain. The poll will be under the supervision of the National Labor Board as will also subsequent elections, whenever held. The thought seems to be that by this device the Board would be given broader power, at least formal support by employees. Simultaneously with this plan, Senator Robert F. Wagner, chairman of the Board, is preparing an amendment to the Recovery Act designed to liberalize the collective bargaining guarantees. The proposed amendment has been discussed with and given the approval of General Hugh S. Johnson, National Recovery Administrator.

These and many other questions will be dealt with at the general conference of all code authorities to be held in Washington. Originally it was stated the conference would begin Feb. 24. General Johnson, however, told the National Emergency Council conference it will take place "around March 1" and that an effort will be made to iron out major inconsistencies and inequities in codes.

Codes to Be Reopened

The onslaught against price-fixing promises to bring about the reopening of many codes. Meanwhile, General Johnson has announced that pending completion of a study of open price associations, he will not approve provisions in codes to prescribe a time limit before the prices filed become effective. Such provisions included in proposed codes now awaiting approval will be stayed for "60 days or pending completion" of the study. The order is not intended to prohibit or stay provisions for open price associations which provide that revised prices shall become effective immediately upon filing. One of the first codes to be brought under the terms of this order is that for the alloy casting industry. Approved on Jan. 30 by General Johnson, and made effective Feb. 4, a provision was written into it stating that open price schedules shall not become effective for 60 days from the effective date of the code. Being a so-called small industry, employing less than 50,000 workers, approval was given by the Administrator rather than by the President. This is in line with a recently adopted policy of NRA.

The purpose of barring a time limit before prices become effective is to prevent so-called price-fixing, so vigorously attacked in the Senate and other quarters. By compelling prices to become effective immediately upon being filed, it is intended that competitors shall have no opportunity to learn prices each has filed and thus be given a chance to adjust prices to a common level. This promises to have a sweeping effect on the operation of all codes, for it is the plan to reopen all codes which now provide for a time limit, generally 10 days, for the effective date of applying prices that are filed with code authorities. Already there have been threats by at least one industry, the Retail Coal Industry, whose code is still pending to withdraw its code unless the industry is given what it terms adequate price protection. The protest is not directly aimed at the "time-limit" provision, but the industry has been informed that it will have to remove price fixing clauses and these do provide for the lapse of short periods before prices filed would become effective. The provision to stay open price schedules 60 days from the effective date of codes is apparently designed to give time for completion of the study to pass upon open price associations. Many believe it will mean the doom of the practice of setting a time limit for

establishing prices. This is one of the objects of the resolution of Senator Costigan asking for a report on all price-fixing clauses in codes. The resolution also calls for reports by the NRA Labor, Consumer and Industrial Advisory Boards.

The F.T.C. Report on Steel

Tied in also with the move is the report made by the Federal Trade Commission on the steel code. Still being withheld from publication, the report sent to the White House has not reached, and may never reach, the "goldfish bowl" stage. But it is understood that it centers its attack on the basing point system in the iron and steel industry as a device for fixing prices, and urges a delivered price system. Resentment is felt by the NRA that the Commission should take upon itself a study of the steel code and the lively attack made recently by General Johnson upon the Commission apparently is due to the Commission's action.

The question of the basing point system is understood to have been discussed by General Johnson and Commissioner March, and the apparent failure of the former to accept recommendations of the Commission made through Mr. March is said to have caused the Commission to lay the issue in the form of a report before the President. It has also been indicated that the Commission resented the NRA taking over the basing point question through the code since the Commission was the first to assume the paternity of this much-discussed issue. But after issuing its cease and desist order in the Pittsburgh-plus case it did nothing further. Meanwhile, however, it saw the natural laws of supply and demand develop added basing points as capacities of various products increase. What will be done in the matter remains to be seen. It is reported that President Roosevelt himself may take up the question with the iron and steel industry. The industry disagrees sharply with the contention that the basing point system encourages price-fixing and is prepared to supply ample supporting evidence to prove its case.

Oil Pricing Order Revoked

The move against price schedules was not confined to only one of the many alphabetical governmental organizations. Others are adopting a similar course. For along with the shift in the NRA policy came announcement of revocation of an administrative order proposing a schedule of minimum prices for petroleum and its products. The order was revoked by Secretary of the Interior Harold L. Ickes, oil administrator. The proposed schedule was due to become effective on Feb. 1. It was on that date the revocation order was announced. Mr. Ickes pointed out that the purchase and marketing agreements submitted to him by the oil industry and approved by him on Jan. 19 are designed to achieve the stabilization of the industry, the primary aim of the administration, and to make unnecessary the promulgation of the proposed minimum price schedule. For these reasons, he said, he revoked his order of Oct. 16 and subsequent orders extending the effective date of the proposed schedule from Dec. 1 to Feb. 1. He stated that should it appear necessary in the public interest in the future to regulate petroleum prices, a new schedule will be prepared under his direction as a substitute for the schedule which was revoked and which had been recommended by the Planning and Coordination Committee representing the industry under the oil code. The revocation nevertheless was in line with the growing opposition to price-fixing schedules.

State Directors Are Primed

Turning to increased efforts to enforce code compliance the State directors of the National Emergency Council have returned to their posts all primed for the duties after hearing President Roosevelt, Executive Director Frank C. Walker, General Johnson, Secretary of Commerce Daniel C. Roper advise them of the work they are to take up through regional set-ups. This is one of the important administrative angles now being entered into deeply by the NRA.

The President emphasized to the directors the necessity of their being "hard boiled" with those trying to make political capital out of their work, declaring the administration would back them "even if you strike at the biggest political boss of your State." In some quarters the remarks of the President were interpreted as an answer to whisperings that the newly formed council opened the way for politics in handing out jobs.

Mr. Walker told the directors that they are direct representatives of the NRA, vested with full authority to supervise its compliance machinery, subject to the rules and regulations promulgated by the NRA. In addition, he told the directors they shall establish and maintain an information service for the purpose of making available factual and authoritative information which will enable citizens to use "effectively, speedily and directly the emergency services which the Federal Government has created."

Secretary Roper declared the policy of the Roosevelt Administration is to restore private and individual initiative and control in business as soon as the business structure of the country is ready to assume its responsibility. The Secretary denied emphatically that there is any intention of destroying the profit system in private business. But, he added, in the interest of all concerned, it must be better controlled, harmonized and balanced. Illustrating, he declared, that "under old conditions, too much profit was devoted to building new production machinery and too little was distributed back to the people to be used as buying power." One of the greatest needs, he said, "is an evenness of distribution of buying power, and it is this objective that business and Government should work together cooperatively to obtain." He also stressed the point that the nation must not expect that the relief now being given from Washington will be permanent. It was declared to be the fundamental responsibility of business to plan definitely to reabsorb as rapidly as possible those who are now on civil work and relief rolls.

Gen. Johnson Explains Background

General Johnson explained the "background" of the whole recovery program and said the Recovery Act naturally fell into three distinct phases as represented, first, by the PRA; second, the more permanent codification of industry and, third, enforcement. As to compliance, General Johnson admitted it has not been as complete as desired, but that in a great majority of the cases that had been examined those charged with violation of codes had agreed to come into line.

When J. J. Hughes, Des Moines, Iowa, sought further enlightenment on the handling of the question of collective bargaining, the Administrator said that the Administration is making no hypothetical rulings on Section 7-a of the Recovery Act but would handle such cases as they arise. The General then referred Mr. Hughes to the assurance given labor of its right to organize in such manner as it sees fit. When he made the statement the President was then preparing his executive order on collective bargaining which obviously is proposed to give labor greater force in dealing with employers.

Nathan Straus, Jr., New York, asked about the naming of labor advisers in the States and when told they had already been selected, George Creel, California, asked the Administrator if he thought that wise. The General said that as to the wisdom of such action he would not comment, but reminded Mr. Creel that the appointments had been made by the governors "and that was all there was to it."

Referring to recent criticism that the NRA oppresses small industries, General Johnson suggested that the only ones being "oppressed" were those which had been working labor unreasonably long hours on starvation wages. Incidentally at about the same time a group of women employees in one section of the NRA

staged a walkout because of long hours they had to work. The NRA, as is well known, is definitely planning in the forthcoming widespread reopening of codes to slash work hours. The amount of trimming has not been determined. Organized labor is "demanding" a 30-hr. week, and though not expecting it, is apparently going to get a sharp concession with the work week well under 40 hr. which applies to such basic industries as iron and steel and automotive.

Suggestions that have been made for setting up under the NRA a system of hours throughout all industry are opposed in a report on hours and wages prepared by the Committee on Manufactures of the Chamber of Commerce of the United States. At the same time the committee recommended that each industry continue to be given separate consideration in determination of minimum wage provisions and that such wage provisions, except in rare instances, should be confined to rates for common labor.

Loans Asked For Cars and Locomotives

WASHINGTON, Feb. 6.—Applications have been made by the New York Central, Chicago & St. Louis and the Lehigh & New England railroads for Interstate Commerce Commission approval of Public Works Administration allotments of $5,062,000 and $1,212,000 respectively, to be used for the purchase of equipment.

The Nickel Plate will purchase 1200 freight cars, 15 freight and five yard locomotives, 20 extra tenders, seven passenger coaches and one mail baggage coach.

The Lehigh & New England will purchase 500 100,000-lb. freight cars.

The Nickel Plate equipment to be bought is as follows:

500 50-ton all-steel box cars, $1,200,000; 675 55-ton all-steel gondolas, $1,552,000; 25 55-ton flat cars, $52,500; 15 freight locomotives, $1,350,000; five yard locomotives, $285,000; 20 extra tenders, $350,000; seven all-steel passenger coaches, with air conditioning apparatus, $247,000; one all-steel mail baggage coach, $25,000.

The equipment to be bought by the Lehigh & New England will consist of 250 steel box cars; 150 all-steel center dumping hopper cars and 100 composite flat bottom gondola cars.

Lake Superior Iron Ore Association, Cleveland, moved its office Jan. 12 to 1170 Hanna Building, that city. For some time the association has occupied quarters in the office building of the Corrigan McKinney Steel Co.

Hearings Develop Opposition To Machine Restrictions

WASHINGTON, Feb. 6.—Determined opposition to the provisions of supplemental trade practices proposed in the code for the shovel, dragline and crane industry was made by Herbert Mertz, of the Orton Crane & Shovel Co., at a hearing before Assistant Deputy Administrator Neal Foster on Jan. 29. The company has offices in Chicago with its plant in Huntington, Ind. Mr. Mertz charged that it had been illegally deprived of Government contracts under irregular code operations and threatened to bring about a Senate investigation of the Shovel, Dragline and Crane Institute unless demands for revision of the code are met. The institute administers the code, which was approved last November. One of the proposed supplementary trade practices would permit all manufacturers to meet the lowest published price in bidding on Government contracts. It was claimed the provision would allow Government purchasing agents to exercise a choice based on factors other than price alone. Mr. Mertz charged that the rule violated the letter and spirit of the Recovery Act, but had been put into effect and had resulted in his company losing contracts with the Interior Department when it was the low bidder. He said the Orton company bids were thrown out on technical grounds arising from classifications of machinery not properly adopted by the Code Authority. His specific demand was that the code not apply to bids on Government business.

H. C. Lutkin, Chicago, counsel for the institute, denied that the provision complained of was discriminatory. On the contrary, he said it would promote competitive bidding. He said the present system which binds the Government to accept the lowest bid within the specifications is too restrictive and often results in the Government being forced to accept machinery not well adapted to the work it is intended to perform. It was explained that the industry desires to correct this situation and give the Government leeway to select the product best suited to the Government's needs. This would be accomplished, it was urged, by the proposed provisions that all manufacturers be allowed to meet the lowest published price of a competitor.

It was brought out that the industry's code contains no provision against sales below cost. Mr. Lutkin said that the state of the industry was responsible for the omission of such a provision. He said the industry had been operating only about 12 per cent of capacity and a prohibition against below-cost sales would necessitate a boost of 25 per cent in prices and hold back rehabilitation. Mr. Lutkin declared the CWA had not materially helped the industry because of the provision requiring that all work possible be done by hand.

Restriction on Improved Machinery

The restriction on the use of machinery, mentioned by Mr. Lutkin, is another growing tendency, coming at a time when some Government sources are emphasizing the necessity of further stimulating the capital goods industry. Indicative of this trend toward barring new equipment is a recommendation of the limestone industry for a limitation on installation of new productive machinery in connection with its code. A hearing on the recommendation, together with a proposed cost formula, will be held on Feb. 14 before Deputy Administrator G. L. Hickling. The proposed restriction on machinery would prohibit installation of new productive equipment, save replacements, except with the permission of the NRA and after the limestone industry as a whole has been given opportunity to enter protest.

The issue also arose at the hearing on Feb. 1 on the code for the drop forging industry when the "expansion of facilities" provision was attacked by R. L. Bradshaw of Machinery and Allied Products Institute, and also in a brief filed by the National Machine Tool Builders' Association. Various members of the advisory boards also expressed their disapproval of the provision. The section provides that before the installation of drop forging machinery, "except for the replacements by any person of an equivalent tonnage capacity of drop forging machinery installed prior to July 15, 1933, and scrapped by that person after the effective date of this code, and except for the moving of machinery" is undertaken by any one whether or not now in the industry, applications must be made to the Code Authority for a certificate granting such installation. The code was presented by C. E. Stone, Milwaukee, chairman of the code committee. The code was sponsored by the American Drop Forging Institute.

Representatives of the Association of Manufacturers in the Aluminum Industry, the Brass Forgings Industries Association and the Farm Equipment Institute withdrew their protest against the industry-proposed definition following indications by proponents of the code to make revisions so as to exclude these groups. Mr. Bradshaw asked that the code be

amended to specifically exclude those making castings for their own use.

Approval by National Recovery Administrator Hugh S. Johnson, acting for the President, of an amended code for the Canning and Packing Machinery Industry was announced on Jan. 29. The meat packing and allied products machinery and equipment group was added to the code. While the order of approval was as of Jan. 27, one amendment was made to become effective 15 days later. It adds to unfair trade practices the making or offering to make a trade-in allowance for any machine more than two years old greater than 15 per cent of the new machine or of the original price of the trade-in machine, whichever is the lower. It is provided that the Code Authority may, at its discretion, increase this percentage.

On Jan. 31 General Johnson announced approval of a supplementary code for the hand chain hoist manufacturing industry, a division of the Fabricated Metal Products Manufacturing and Metal Finishing Coating Industry. The supplementary codes will go into effect Feb. 9. The order of approval postpones for 60 days the provision requiring the filing of price lists by members of the industry with the Code Authority.

President Roosevelt on Jan. 31 approved a code for the construction industry and in a letter to General Johnson expressed the belief it would solve many of the problems which have distressed this industry, rated as the second largest in the United States. The President also voiced the hope that the National Construction Planning and Adjustment Board set up to handle labor and trade relations in the industry would begin functioning promptly and effectively and report back to him proposals for settling such disputes as now exist.

General Johnson described the code as "perhaps the most comprehensive self-governing instrumentality yet conceived" under the NRA and as representing "the very essence of the spirit of cooperation with which the National Recovery Administration has attempted to associate itself." He particularly called attention to the adjustment board of 10 representatives of labor, 10 representatives of capital and a disinterested chairman named by the President, which is created to iron out controversies in the industry. The National Adjustment Board and regional subboards are to negotiate agreements on hours, wages and other labor conditions. In summarizing for the President the economic effects expected from the code, General Johnson declared it gave to the industry for the first time the power of coordinated action to check fluctuations, which have ranged from 100 per cent to 50 per cent below normal requirements, and thus permit the industry to work toward stabilization based on demand.

Hearings Held on Screw And Galvanizing Codes

WASHINGTON, Feb. 6.—Hearings were held last Friday before NRA Assistant Deputy Administrator L. S. Horner on five codes as additional subdivisions of the code for the Fabricated Metal Products Manufacturing and Metal Finishing and Metal Coating Industry. The supplemental codes covered the galvanizing, machine screw, machine screw nut, cap screw and wood screw manufacturing industries.

When C. M. Dinkins, counsel for the Fabricated Metal Products Federation, presented the code for the galvanizing manufacturing industry, Mr. Horner said there was a question whether the proponents of the code were truly representative of the industry "as so broadly defined." He stated that the Administration had received protests from many sections of the country regarding an apparent overlapping of this code and the codes now regulating other industries.

Appearing for subsidiaries of the United States Steel Corpn., C. E. Meissner read a telegram in which his principals objected to having the proposed code apply to galvanizing of such products as they manufacture when such operation is merely incidental to the manufacturer's primary business of producing steel. This and other differences were gone over after the hearing at a conference between steel representatives and members of the code committee.

E. P. Delaney, representing the NRA legal division, questioned several provisions of the administrative section of the code and stated that he would object strenuously to any attempt, in any code, to confer upon the Code Authority the power to establish fines or penalties for non-compliance. He contended that the Recovery Act made no provision for penalties other than those specifically set forth in the act. This point also was discussed at a post-hearing.

H. A. Greenberg, representing the Penn Galvanizing Co., Philadelphia, proposed an amendment which would limit the operation of galvanizing kettles to two weekly shifts of 40 hr. each. He said such limitation would more equitably distribute among all organizations in the industry such reduced volume of business as was available. T. M. Gregory, a member of the code committee, strongly opposed the amendment. He declared it would work a hardship upon the consumer and would result also in depriving some 50 or 60 employees of his Pittsburgh plant of all work. Similar objection was raised by G. H. Koven, representing seven galvanizing manufacturers in the metropolitan district of Jersey City, N. J. Joseph P. Cattie, Philadelphia, also objected to the amendment.

An amendment which would commit the industry to studies looking toward establishment of standards of quality and classification for its products was proposed by Raymond Kenny, representing the NRA Consumers' Advisory Board. Members of the code committee indorsed the amendment.

Government Planning to Direct Cost Accounting

WASHINGTON, Feb. 6. — The NRA study of open price associations has as its underlying plan the setting up of a cost accounting system. The study is the outcome of a change in the price policy of the NRA, which heretofore not only permitted price schedules but encouraged them in some codes, though supervisory power was held over the prices to keep them on a reasonable basis. The object was to prevent selling below cost and to oust chiselers.

But attacks in price-fixing swung the NRA to a new course. It determined to prepare a plan of cost accounting and has the study well under way, though no definite conclusions have been reached as to all the factors that will be included in the plan.

It was because of this program that National Recovery Administrator Hugh S. Johnson on Jan. 27 announced that pending completion of a study of open price associations, he will not approve provisions in codes to prescribe a time limit before the prices filed become effective. Such provisions included in proposed codes now awaiting approval will be stayed "for 60 days or pending completion" of the study. It is also planned to reopen all codes having price schedules and the subject will be one of many gone over when there will be a general combing of all codes at the meeting of all code authorities in Washington. No date has been set for the meeting but it is probable it will be held toward the end of the present month or early in March.

General Johnson has stated hearings will be held before he approves any cost accounting system. The plan is also tied in with the newly created National Emergency Council which through 48 directors, one from each State, will have charge of code compliance.

It is apparently partially because of the price policy that difficulty is being experienced in selecting con-

sumers' advisers for the state directors. Labor advisers have been selected by Secretary of Labor Frances Perkins.

General Johnson said that it is the policy to have public hearings on all price provisions of approved codes where the question is of importance to the public.

There are differences over what constitutes "cost" and this question is being given much consideration. Examples of this point are numerous. Among them is the proposal of retail druggists. They are proposing a limited figure under which they shall not sell lower than the wholesaler's price in dozen lots. General Johnson considers that this plan comes close to manufacturers' resale prices, though he has not definitely made up his mind on the question.

In discussing complaints in the Senate against the steel, oil and other codes, resulting in the adoption of a resolution by Senator Borah for an investigation by the Federal Trade Commission of the steel code, General Johnson said that it is an invariable rule that the Government member of a code may veto an act but that he might not vote. The purpose, it was stated, is to avoid putting the government representative in a position of approving the act of any code authority. This observation was made by reason of the statement of NRA General Counsel Richberg, one of the NRA representatives on the steel code authority, that the Government members have not approved a single act of the Board of Directors of the American Iron and Steel Institute, code authority for the steel code.

Failure of Rail Steel

DURING December the testing at the Bureau of Standards of specimens from a plain carbon steel railroad rail broken at elevated temperatures under extremely slow rates of tensile loading was completed. The data together with similar previous data show that "secondary brittleness," as revealed by low values for elongation and reduction of area in a tensile test, occurs at a temperature of 840 deg. F, under a low rate of loading instead of at a temperature of 1020 to 1110 deg. F, at which this phenomenon occurs when the load is applied somewhat faster or even at an extremely rapid rate as in impact. The results of these tests of rail steel at elevated temperature are believed to have an important bearing on the formation of the hidden defects in rails, known as "transverse fissures."

Jones & Laughlin Steel Corpn., in the final quarter of 1933, had a net loss of $626,418, bringing its net loss for the year to $5,366,997. In 1932 the loss amounted to $7,910,149.

Executive Order Broadening Labor Board's Powers May Bring Court Action

WASHINGTON, Feb. 6.—Test of the authority of the NRA National Labor Board appears to be near at hand. It promises to grow out of President Roosevelt's executive order of last Thursday giving the Board supervisory power over employee elections to choose representatives for collective bargaining.

The vigorous statement coming from the American Iron and Steel Institute attacking the interpretation placed on the order contains points that have not been smoothed out. This despite a joint statement issued last Saturday by National Recovery Administrator Hugh S. Johnson and NRA General Counsel Donald Richberg, who wrote the executive order. This statement was presented as an explanation because of what it called "an erroneous press" interpretation of the executive order.

The joint statement apparently did smooth over the one source of complaint made by the Institute. For it was declared that "In so far as the statement in the (NRA) press release might be read as saying that employees' representatives in all company unions are chosen by employers it was not intended as there is no evidence of such a case." The press release referred to had stated that the President's order is the direct result of the growing tendency on the part of industrial managements to build up "company unions" in their plants, and then followed with the declaration that "These unions are operated by employees' representatives chosen by the employer rather than by the employees themselves." The Institute branded this statement as a "flagrant misrepresentation of facts."

The Johnson-Richberg statement was therefore a retraction of that given out by the NRA itself. Going even further, the joint statement denied that "it is true that employees if permitted to act in their own free choice, may not select a company union (meaning local plant union)."

Reverses Previous Rulings

The Johnson-Richberg interpretation also was intended to meet a point raised by James A. Emery, general counsel for the National Association of Manufacturers, who discussed the executive order with General Johnson shortly after it was promulgated. Mr. Emery charged that the order reversed previous NRA rulings that Section 7-a of the Recovery Act permitted minorities or individuals to bargain with employers, one such ruling in effect having been made in a joint statement on Aug. 24, 1933, by Mr. Johnson and Mr. Richberg. Their statement of last Saturday, however, said that the one of last August provides an interpretation of Section 7-a which nas not been changed and is not modified by the Executive order. It was also pointed out that the selection of majority representatives "does not restrict or qualify in any way the right of minority groups of employees or of individual employees to deal with their employers."

Nevertheless the interpretative joint statement declared that "As a practical proposition the National Labor Board would find it impossible to deal with every controversy that might arise between rival groups of employees. . . . Nor could any employer maintain satisfactory relations with his employees through limited negotiations with an indefinite number of employee representatives expressing every possible variety of opinion. The most important question to be solved in carrying out the purposes of Section 7-a is to determine who are the representatives of the majority of the employees affected. It is for the purpose of solving that problem that the Executive order was issued, which in no way excludes the exercise of rights by minorities or individuals."

Majority to Represent All Employees

The executive order, however, says that representatives chosen by a majority of workers "have thereby been designated to represent all the employees" and apparently was intended to forestall the contention of either side that an election was not representative because its supporters did not participate in the election.

The Johnson-Richberg statement also sought to answer the charge of the American Iron and Steel Institute that "For elections to be ordered by the National Labor Board upon the request of a mere handful of employees in any plant would mean constant disturbance and confusion in the industry." This was seen in the declaration of the joint statement that "The executive order provides a method whereby any specific group of employees or all employees of a plant or of one employer may select, by a majority vote, representatives clearly empowered to act for the majority in their relations with their employer."

It is believed that this will be a point of sharp conflict as will be the sweeping powers the executive order gives the Board to determine "in such manner as it sees fit" when a substantial number (as defined at the discretion of the Board) of the employees, or any specific group of employees . . . have requested the Board to conduct an election."

The order was the direct outcome of the Board's controversy with the

Weirton Steel Co. Senator Robert F. Wagner, chairman of the Board, has announced that the Board by direction of the President would take immediate steps to ascertain if there is a substantial demand among workers of the Weirton Steel Co. for an election. Making the statement last Wednesday, the Senator said he had ordered that a representative of the Board should go to Weirton, W. Va. The Board's action, he said, was in accord with the President's statement to a delegation of representatives of the Amalgamated Association of Iron, Steel and Tin Workers from the Weirton plant that if a substantial number of the Weirton workers desired the election it would be held immediately under the supervision of the National Labor Board.

Wagner On Warpath

The Senator gave scant attention to the American Iron and Steel Institute statement, dismissing it with the comment that "The Board heard all that argument last Autumn and went right on sticking to its work and will continue to do so."

The brief comment, however, was held to join the issue and invite a test of the powers of the Board. While the Weirton case proposes to take front rank in the test, coming a close second apparently with a largely similar controversy the Board has with the Budd Mfg. Co., Philadelphia, builder of automobile bodies.

Under the interpretation placed on the executive order it would be a code violation, and therefore referable to the National Compliance Board, for an employer not to recognize representatives chosen by a majority of votes for collective bargaining. Hence the cases, if they develop, promise to hinge on charge of violation of the steel and automobile manufacturing codes. The present contention resting against the Budd company is a violation of the automobile code, while the Weirton case was referred to the Department of Justice, though no known action has been taken in either case.

Labor Board Authority Doubted

There is, of course, doubt even by its supporters as to the authority of the National Labor Board. Likewise there is a growing belief that the Board should be reorganized in an effort to make it more effective. It may develop into the early setting up of Board panels, one representing industry and the other labor, with an impartial chairman, to hear cases coming before them. Objection has been raised that in the past cases have come up when representatives of only one faction of the Board have been present at hearings, and this side representing the views contrary to those of persons coming before the Board.

President William Green of the American Federation of Labor, commenting on the executive order, said it was "a good first step to put teeth" in the collective bargaining section of the Recovery Act, "but only a first step." He declared that the President's order is good in that it enables the National Labor Board "to step in and conduct an election whenever the Board sees fit, without waiting for a condition of strife to develop, and especially in that it provides that the employer shall recognize these elected representatives and deal with them."

Going further, however, Mr. Green said that "Until it is interpreted that representatives financed by the company, even though elected by the employees, are not proper representatives of the employees for purposes of Section 7-a . . . there is unfair competition between company unions and bona fide labor unions." After giving his definition of a company union as an "employees' organization initiated by the company, financed by the company, controlled by the company," Mr. Green declared that election in individual plants supervised by the National Labor Board should not be confused with real collective bargaining. He insisted "there is need for organization of workers on a basis at least as wide as the organization of the employers in trade associations for code making and code enforcement. In the long run we must look to independent organization of workers on a national or international basis for real collective bargaining."

Johnson Explains Position

In his press conference last Friday, General Johnson was besieged with questions seeking interpretation

The Closed Shop and Business Recovery

THE President's executive order empowering the National Labor Board to hold a new election of employee representatives at the Weirton Steel Co. is in such broad terms as to cause country-wide apprehension among employers. The order empowers the board to conduct an election of employees in any plant whenever in its judgment a substantial number of workmen desire such action. The board, likewise, is authorized to recognize those selected by a majority of those voting *(not necessarily all those eligible to vote)* as the employee representatives in the plan.

This order is an open invitation to labor agitators to create a maximum of disturbance in all open-shop plants. It encourages strife and discord at a time when all interests should be working unitedly for a recovery which has by no means been achieved. It does not matter whether a company has religiously carried out every provision of the code under which it is operating. It is of no moment if its record in industrial relations has been above reproach. It is immaterial if it has raised wages and spread employment at the expense of profit. More important than all these considerations, apparently, is an open door to the Labor Board every time it decides an employee election is necessary. And it is clear that such elections will be held as often as is necessary to displace independent unions with national unions. This is evident from the chairman's outspoken opposition to "company" unions.

One can only hope that Senator Wagner's viewpoint is not shared by the President. It is possible that the President, with his deserved prestige and great popular support, could enforce nation-wide unionization if he chose to do so. But such a drastic change could not be effected without incurring the overwhelming opposition of employers and fomenting disturbance, strife and confusion at a time when the country can least afford it. Surely the closed shop is not more important than business recovery.

of the executive order and also had heard industrial organizations which were disturbed by the order, or at least by the NRA press release interpreting it. General Johnson readily said it needed "clarifying" and that was the reason for the conference he held with Mr. Richberg and the subsequent joint statement they issued.

At the press conference the General said he did not interpret the order as, in effect, legalizing the closed shop.

The point was raised as to the significance of the word "group" in the order. It was asked whether a substantial number of a "group" or a "group" of employees means all of a certain craft in a given plant.

"Yes, that was the reason 'group' was used, because there are several of these industries that have half a dozen unions in their plants," said the General.

The General has been invited to appear tomorrow before the House Committee on Labor to testify on the 30-hr. week bill introduced by Chairman William P. Connery, who is asking Administration support of his effort to have this limitation written into all recovery codes. General Johnson has steadfastly opposed the 30-hr. week, but is on record in favor of reducing the work week below 40 hr.

Other witnesses to appear before the committee are Mr. Green and Secretary of Labor Frances Perkins, together with representatives of industry who oppose the measure. It is not thought it has any chance of passage in view of the apparent opposition of the Administration.

P.W.A. Allotments for Railroad Rehabilitation

WASHINGTON, Feb. 6. — The Public Works Administration last Thursday announced that a contract had been entered into with the Southern Pacific Co. for a loan of $12,000,000 to the latter which, among other things, will purchase 40,000 tons of rails, 364,000 lb. of spikes, 650,000 tie plates and to make heavy repairs to 748 locomotives, 3811 freight cars and 406 passenger cars. The program is to be completed on or before Jan. 1, 1935. The work is to be done on the Pacific and Texas and Louisiana divisions of the carrier.

Detailed steel items to be purchased follow:

Pacific Division: 40,000 gross tons of rails, f.o.b. Pacific Coast, at $43.-758 per ton; 3500 net tons of joints at $70 per ton; 285 nut locks at $60 per 1000; 842,500 lb. track bolts and nuts at $3.65 per 100 lb.; 450,000 tie plates at 33c. each; 1100 net tons of spikes at $2.50 per 100 lb.; 2000 pairs of insulated joints at $11 per pair; 290 frogs and switches at $300 each; 500,000 rail anti-creepers at 20c. each.

Texas and Louisiana Division: 85,000 lb. track bolts and nuts at $3.65 per 100 lb.; 200,000 tie plates at 33c. each; 180 net tons of spikes at $2.50 per 100 lb.

Of the locomotives to be repaired, 494 are for the Pacific division and 254 for the Texas and Louisiana division.

On the Pacific division 2866 freight cars will be repaired and on the Texas and Louisiana division, 945 are to be repaired. Repairs will be made on 300 passenger cars on the former division and 106 on the latter. Repairs and renewals of trestles and culverts will represent an outlay of $1,305,700.

In a letter to Frank C. Wright, director of Transportation Loans for the Public Works Administration, Chairman Hale Holden of the Southern Pacific Co. expressed gratification at the signing of the contract and announced that the Southern Pacific is purchasing the rails and will be allocating the order at once, to be followed by early allocation of necessary track fastenings, additional orders of ties, lumber and other material to enter into the track work and reconditioning of locomotives and cars.

Allotments for loans to railroads made by the PWA up to Feb. 4 totaled $199,607,800, of which $41,-000,000 has been set aside for future distribution for rails and fastenings.

Allotments have been distributed as shown in table below.

New York-Washington—		
Pennsylvania Railroad Co.	Electrification and equipment	$79,000,000
Lehigh & New England Railroad Co.	New freight cars	1,500,000
New York, New Haven & Hartford R. R.	Equipment	5,500,000
Northern Pacific Ry.	Locomotives	1,250,000
Chesapeake & Ohio Ry.	Gondola cars	18,290,000
Erie Railroad	New equipment	11,964,000
New York, Chicago & St. Louis R. R.	New equipment	5,629,000
Boston and Maine R. R.	New equipment and repairs	5,500,000
Central of Georgia R. R.	New equipment	500,000
Interstate R. R. Co.	R. R. improvements	250,000
Receivers Wabash Ry.	R. R. improvements	1,489,800
Kansas, Okla. & Gulf Ry. Co	R. R. improvements	265,000
Baltimore & Ohio R. R.	New equipment	4,230,000
Southern Pacific Co	R. R. improvements	12,000,000
Illinois-Central R. R.	R. R. improvements	9,300,000
Midland Continental R. R.	Equipment	40,000
Lehigh Valley Railroad	Equipment	2,500,000
Total		$158,607,800

State Groups of N. A. M. To Meet Monthly

TO insure closer cooperation between the National Association of Manufacturers and the National Industrial Council, composed of State manufacturers' association, Clinton L. Bardo, president of the association, today appointed the following committee, representative of the State groups, to meet monthly in Washington with officers of the N. A. M.:

Mark A. Daly, Secretary, Associated Industries of N. Y. State, Root Building, Buffalo.

Elmer Donnell, Manager, Associated Industries of Missouri, 2004 Railway Exchange Building, St. Louis.

James L. Donnelly, Exec. Vice-President, Illinois Manufacturers Association, 120 South La Salle St., Chicago.

C. L. Eyanson, Assistant to the Pres., Mfrs. Association of Conn., 50 Lewis St., Hartford, Conn.

J. L. Lovett, General Manager, Michigan Manufacturers Association, 1001 First National Bank Building, Detroit.

Frank G. Louthan, Secretary, Virginia Manufacturers Association, State Planters Bank Building, Richmond, Va.

J. P. McGrath, Secretary, Georgia Manufacturers Association, Glenn Building, Atlanta.

While this committee will directly represent the council at these monthly meetings, Mr. Bardo emphasized that the executive officer of every State association is urged to attend the meetings to attain greater cohesion of activities.

In addition, by an amendment to the constitution of the N. A. M. adopted at the annual convention last December, five additional directors of the association, drawn from the presidents of State associations, will be appointed soon.

Pig Iron Output Up 2.8 Per Cent In January

PRODUCTION of coke pig iron in January totaled 1,215,226 gross tons, compared with 1,182,079 tons in December. The daily output in January, at 39,201 tons, showed a gain of 2.8 per cent over the December daily rate of 38,131 tons.

There were 87 furnaces in blast on Feb. 1, making iron at the rate of 41,085 tons a day, compared with 75 furnaces on Jan. 1, operating at the rate of 35,505 tons a day. Fourteen furnaces were blown in during January and two were blown out or banked, making a net gain of 12 furnaces. The Steel Corporation put in nine furnaces, independent steel companies put four in and took one off blast, and merchant producers put one in and one out.

Among the furnaces blown in are the following: One Carrie, one Clairton, two Duquesne, one Edgar Thomson, one Ohio and one Mingo, of the Carnegie Steel Co.; one Monongahela and one Lorain, of the National Tube Co.; one Campbell furnace, of the Youngstown Sheet & Tube Co.; one Weirton furnace of the Weirton Steel Co.; one Betty, of the Republic Steel Corpn.; one Columbus furnace, of the American Rolling Mill Co., and a Palmerton furnace of the New Jersey Zinc Co.

Furnaces blown out or banked include: One Aliquippa, of the Jones & Laughlin Steel Corpn., and one Toledo furnace of Pickands, Mather Co.

Daily Average Production of Coke Pig Iron

Gross Tons

	1934	1933	1932	1931
January	39,201	18,348	31,380	55,299
February	.....	19,798	33,251	60,950
March	.....	17,484	31,201	65,556
April	.....	20,787	28,430	67,317
May	.....	28,621	25,276	64,325
June	.....	42,166	20,935	54,621
½ year	.....	24,536	28,412	61,356
July	.....	57,821	18,461	47,201
August	.....	59,142	17,115	41,308
September	.....	50,742	19,753	38,964
October	.....	43,754	20,800	37,848
November	.....	36,174	21,042	36,782
December	.....	38,131	17,615	31,625
Year	.....	36,199	23,733	50,069

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1934	1933	1934	1933
January	1,215,226	568,785	11,703	8,810
February	.....	554,330	.....	8,591
March	.....	542,011	.....	4,783
April	.....	623,618	.....	5,857
May	.....	887,252	.....	5,948
June	.....	1,265,007	.....	13,074
½ year	.....	4,441,003	.....	47,063
July	.....	1,792,452	.....	18,661
August	.....	1,833,394	.....	16,953
September	.....	1,522,257	.....	13,339
October	.....	1,356,361	.....	16,943
November	.....	1,085,239	.....	14,524
December	.....	1,182,079	.....	9,369
Year	.....	13,212,785	.....	136,852

*These totals do not include charcoal pig iron. The 1932 production of this iron was 15,055 gross tons.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

Tons

	1934	1933	1932
January	7,800	2,602	6,256
February	....	2,863	7,251
March	....	2,412	7,157
April	....	1,908	5,287
May	....	3,129	4,658
June	....	4,088	6,090
July	....	6,783	3,329
August	....	7,756	3,070
September	....	10,034	3,213
October	....	8,634	4,286
November	....	7,639	4,435
December	....	8,358	3,674

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons) January (31 Days)	Production (Gross Tons) December (31 Days)	February 1 Number in Blast	February 1 Operating Rate, Tons a Day	January 1 Number in Blast	January 1 Operating Rate, Tons a Day
New York:						
Buffalo	77,124	76,384	5	2,490	5	2,465
Other New York and Mass.	12,933	14,866	2	415	2	480
Pennsylvania:						
Lehigh Valley	27,213	25,238	3	910	2	815
Schuylkill Valley	24,003	23,649	2	775	2	765
Susquehanna and Lebanon Valleys	8,533	11,072	1	390	1	355
Ferromanganese	2,256	2,295	1	75	1	75
Pittsburgh District	195,640	229,320	15	6,540	10	5,660
Ferro. and Spiegel	3,510	3,494	1	115	1	115
Shenango Valley	17,516	15,577	1	565	1	500
Western Pennsylvania	39,587	30,309	2	1,275	2	980
Ferro. and Spiegel	...	1,358	0	....	0	...
Maryland	59,338	53,191	3	1,905	3	1,715
Wheeling District	83,696	67,650	3	2,925	3	2,035
Ohio:						
Mahoning Valley	117,080	106,495	8	4,640	6	3,210
Central and Northern	152,494	126,112	10	4,920	8	4,070
Southern	21,379	33,968	3	690	3	715
Illinois and Indiana	184,766	168,218	9	5,960	9	5,295
Mich., Wis. and Minn.	44,925	35,504	3	1,450	3	1,145
Colo., Mo. and Utah	16,670	17,014	2	540	2	550
The South:						
Virginia	....	...	0	....	0	....
Kentucky	9,918	13,326	1	320	1	430
Alabama	110,708	124,756	9	3,995	9	4,055
Ferromanganese	5,937	2,283	1	190	1	75
Tennessee	....	....	0	....	0	....
Total	1,215,226	1,182,079	87	41,085	75	35,505

Foundry Practice Meeting In Birmingham

A FOUNDRY practice meeting will be held at Birmingham, Feb. 19 and 20, at the Tutwiler Hotel. It will be held under the auspices of the Birmingham section of the American Society of Mechanical Engineers with the American Foundrymen's Association cooperating. Plant visitations will feature the meeting, for which two papers are scheduled for presentation on the afternoon of Feb. 20, as follows: Dust abatement in the foundry, by E. O. Jones, National Founders' Association, and developments of applications of castings through the use of alloys, by E. K. Smith, Electro-Metallurgical Co., Chicago. John M. Gilfillan, of the Birmingham section, is responsible for the meeting, which is expected to be like one held last year under the same joint sponsorship. The organization of the meeting is under the direction of John A. Sirnit, vice-president, Alabama Power Co., Birmingham.

THE NEWS OF THIS WEEK

Steel Institute Sees Labor Upset From Labor Board Rule

EXECUTIVES of all of the leading steel companies issued a formal statement last Saturday commenting upon the President's executive order concerning the election of representatives for the purpose of collective bargaining. The statement is as follows:

The steel industry is cooperating wholeheartedly with the President in his efforts for national recovery, and subscribes fully to the principle of collective bargaining as provided in Section 7a of the National Industrial Recovery Act.

In accordance with this principle, employee-representation plans are in operation throughout the industry. They are functioning effectively and are providing employees with representatives chosen by them in free and untrammeled elections.

The employee-representation plan is a modern and effective method of collective bargaining. It operates in the best interest of all the workers, and by promoting peace and harmony in industrial relations instead of strife and irritation it benefits industry and the consuming public.

We regard the analysis of the Executive order, which, according to the press, was issued by the NRA as a direct threat against the peaceful industrial relations long prevailing in the steel industry. It threatens the whole national industrial recovery program.

The published statement by the NRA to the effect that so-called company unions are operated by employees' representatives chosen by the employers rather than by the employees themselves is a flagrant misrepresentation of facts. We regard it as a violation of public trust for a Government agency to issue such a statement to the public. It can indicate nothing other than an intention to accomplish a complete domination of all industry, affecting the lives of millions of people, by union organizations which represent less than 10 per cent of the industrial employees of the nation.

Fears Constant Confusion

For elections to be ordered by the National Labor Board upon the request of a mere handful of employees in any plant would mean constant disturbance and confusion in the industry. We regard many of the decisions and acts of the board as clearly intended to encourage unionism and to impose it upon industry. On that account, we cannot consider the board to be an impartial body.

Evidences of the bias of the board are found in the rules heretofore prescribed by it providing for nominations of candidates in employee elections by petition instead of by the established American custom of secret ballots as practised in the primaries for the selection of candidates for public office. The petition plan permits names to be placed on the ballot for the employee's vote by only ten signatures. We regard this as undemocratic and as opening the door to union intimidation of employees.

To provide that an election shall be held when a "substantial" number of employees shall demand it, and to give to the National Labor Board the right to determine what constitutes a "substantial" number of employees, may force an election whenever a handful of discontented workers, who might be only union organizers, demand it. This is bound to be a constant source of confusion.

To make the wish of a majority of the number who shall vote, although they may be only a small percentage of the whole number of employees, compulsory upon all the employees is a direct violation of Section 7a of the National Industrial Recovery Act, which gives to any number of employees the right to choose their own representatives for collective bargaining.

The steel industry desires to define its position clearly and emphatically on this matter. While affirming complete confidence in the desire of the President to deal fairly in all matters affecting both labor and industry, it is convinced that the practical effect of this order would be unfair to both.

The steel industry maintains that its employees' representation plans meet every requirement of the National Industrial Recovery Act in respect of collective bargaining. It intends in every practical and lawful way to resist all attacks upon such plans.

Employment and the Thirty-Hour Week

MORE than 600,000 wage-earners previously unemployed were given work in the manufacturing industries of the United States in the period from July to October, 1933, according to estimates announced today by the National Industrial Conference Board. This increase was brought about by reduction in average hours per week from 42.3 in July to 35.8 in October.

The total number of wage-earners normally employed in the manufacturing industries is estimated by the Conference Board at 9,000,000, and the number at work in October, at 6,686,000. According to these estimates there remained unemployed in October, a slack of 2,314,000 industrial wage-earners.

Possibility of Taking Up Slack

Examining the possibility of taking up the slack in employment by shortening the work week to 30 hr., the Conference Board finds that with no greater production than in October this would absorb only a little more than one half of the estimated slack. Computations of the Conference Board indicate that a 30-hr. week with October production would provide work for 7,979,000 wage-earners, or 1,293,000 more than the number estimated to have been at work in October, but would leave 1,021,000 still

unemployed; and that to provide employment for all the 9,000,000 potential workers without increasing production would require reduction of work time to 26.6-hr. per week.

Another estimate prepared by the Conference Board shows the approximate number of workers that would be required on a 30-hr. week basis to maintain a volume of production comparable to that in 1929. In that year the average number of workers employed in the manufacturing industries was 8,838,743, and the average number of hours worked per week was 48. If working hours averaged only 30 per week, it is estimated by the Conference Board that 15,152,131 workers would be required to turn out the same volume that was produced in 1929 by 8,838,743 wage-earners working 48 hr. per week.

No such number of workers was available in 1929. The maximum number of wage-earners available for manufacturing operations in that year is estimated by the Conference Board at 9,302,504. This figure falls almost 6,000,000 short of the number estimated to be required at an average of 30 hr. per week to produce the output of 1929.

Construction Institute Issues Special Report

AMERICAN INSTITUTE OF STEEL CONSTRUCTION has issued a special eight-page report on "Highway Crossings." It calls attention to the fact that there is nearly 2½ billions of dollars in deferred construction requirements in the division of grade crossing elimination. Of this total, plans, engineering surveys, etc., have been completed on enough projects to put one billion dollars at work during 1934, were the funds available.

The special report lists the "ready" projects by States and localities and gives data showing the accident and death rate now obtaining through lack of these facilities.

A. O. Smith Corpn. Feels Auto Demand

A. O. SMITH CORPN., Milwaukee, has recalled approximately 200 men, largely in the automobile frame department, as the result of increased passenger car manufacturing operations in Detroit, Kenosha, Wis., and other centers. The total payroll at the Smith works is now 4500, an increase of 600 or more since Jan. 1.

The operating rate of the steel industry for the week beginning Feb. 5 was 37.5 per cent as compared with 34.4 per cent last week, according to the American Iron and Steel Institute.

British Tin Plate Prices Up Iron Melters Buy Belgian Coke

LONDON, ENGLAND, Feb. 6.—(*By Cable*).—While British coke furnaces are hurrying to increase output, Cleveland iron masters have been forced to supplement their requirements by purchasing coke from Belgium.

Pig iron demand is strong, but official prices remain unchanged, most consumers now being covered for the first quarter. Bilbao ore is now 17s. c.i.f. at Tees.

Semi-finished steel demand remains unabated and finishing mills are on better schedules. New ship building is materially increasing in volume.

Export demand for steel is dull. Tin plates are steadier with talk of an approaching agreement with Continental rollers and an anticipation of higher prices. Some works are asking up to 17s. basis IC f.o.b. works port, but business is still being done at from 16s. 3d. to 16s. 6d. Inquiries are moderate, however, and orders are still small.

Continental Steel Cartel has raised the export exchange coefficient to 1.625 and has notified approved export merchants that unspecified overseas contracts are subject to the increased exchange factor and to any other exchange variation that may develop. As a result, the market is confused.

There is talk of the export price of bars being established at £3 5s. gold. The Cartel's January bookings exceeded 200,000 tons.

At the annual dinner of the London Iron and Steel Exchange, Sir William Firth, chairman, Richard Thomas & Co., stressed the need for a temporary Government control of British iron and steel activities. Charles Mitchell, chairman of the National Committee, however, disagreed strongly with Sir William.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9			
Billets, open-hrth.	£5 10s.	to	£5 12s.	6d.
Tin plate, per base box	16s. 3d.	to	16s.	9d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.	
Beams, open-hrth.	£7 7½s.	to	£7 17½s.	
Channels, open-hearth	£7 12½s.	to	£8 2½s.	
Angles, open-hearth	£7 7½s.	to	£7 17½s.	
Black sheets, No. 24 gage	£9 5s.			
Galvanized sheets, No. 24 gage	£11 5s.	to	£11 15s.	

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

*Ingots	£2 5s.
*Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
*Steel bars, merchant	£3 2s. 6d.
*Sheet bars	£2 8s.
Plates, ¼ in. and up	£4 1s. 6d.
*Plates, 3/16 in. and 5 mm.	£4 3s. 6d.
*Sheets, ⅛ in.	£4 8s. 6d.
*Ship plates	£4 10s.
*Beams, Thomas	£2 19s.
*Angles (basis)	£3 2s. 6d.
Hoops and strip steel over 6-in. base	£3 17s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

*Prices as established by European Raw Steel Cartel.

Kaganovich Hints At Soviet War Preparation

THE declaration that the Soviet Union will manufacture all its steel requirements by 1937 was made by M. Kaganovich, Stalin's chief lieutenant to the regional party conference, recently held in Moscow. He declared that during the first five-year plan the Soviet had had to import more than $750,000,000 worth of industrial equipment, but that there was no intention of continuing these purchases. Now that the Soviet has built up its own industry, he said, it hopes very soon to be able to cease importing equipment altogether.

To show how rapidly and effectively the Soviet is closing this Russian market to foreigners, Mr. Kaganovich referred to agricultural and industrial machinery and steel.

"High-grade steel," he declared, "is more necessary than ever now for building bullet-proof cars, airplanes, tractors, and tanks. Nevertheless, despite the sharp increase in consumption, imports have been successfully reduced. In 1932 this figure was down to 17 per cent, and in 1933 to 9 per cent. In 1934 the Soviet hopes to import only 2.5 per cent of the steel consumed, and by 1937 to cease importing steel altogether.

"In 1928 imports of industrial machinery equaled 15 per cent of the Soviet's home output. In 1932 this figure was down to 5 per cent, and by 1937 we hope it will be only 0.6 per cent."

Lynch Corpn., has acquired the plant of the Ames Shovel Works, Anderson, Ind. Operations will be consolidated with Millier Mold & Machine Co., which was purchased by the Lynch Corpn. last fall.

Heald Company Exhibits Grinders And Precision Boring Machines

A NUMBER of internal grinding machines, including a new centerless internal grinder and four or more Bore-Matic precision boring machines were demonstrated in operation by the Heald Machine Co., at its plant at Worcester, Mass., Feb. 1 and 2. Rotary surface grinders, a 48-in. swing vertical internal grinder, several styles of the company's Red Head grinding and boring heads, diamond and carbide "borizing" tools and an automatic sharpener for these tools were also shown. Specimens of work done on all of these machines, as well as unit parts of the machines themselves and some of the tools, jigs and fixtures used in the production of those parts, were also displayed. The plant was open for inspection, so that the manufacture and assembly of some of the different machines might be seen.

Twelve Years of Progress

The keynote of the internal grinder exhibit was indicated by the "Twelve-Years-of-Progress" placard at the entrance to the grinder exhibition space. It referred to the grinding of a hardened machine-steel part, from which 0.010 in. of stock was removed. In 1922, using a hand loaded, manually-operated Heald machine, with size control by hand plug, the piece was ground to a tolerance of 0.001 in. at the rate of 20 pieces an hour. In 1934, using the new Heald internal centerless, which is entirely automatic, including size control and loading and removing of the work, the same piece is ground to a tolerance of 0.0003 in., at the rate of 100 pieces an hour.

Two of the centerless internal grinders were in operation, one on straight and one on tapered work. In removing 0.010 in. of stock, production was at the rate of over 100 pieces an hour, and tolerance of 0.0003 in. was maintained on the diameter and 0.0001 in. in straightness, roundness, and concentricity. The construction and operation of this machine will be outlined in a forthcoming issue of THE IRON AGE.

Chuck-type internal grinders included a standard No. 81 machine, recently announced. Equipped with the Gage-Matic sizing device, this machine was demonstrated in the grinding of inner ball-bearing races, two at a time in a shuttle. The hole in these races is 0.6875 in. in diameter and 7/16 in. long. Stock of 0.010 in. was removed, and a tolerance of 0.0003 in. was held on the diameter, and 0.0001 in. in straightness and roundness. Production was at the rate of 280 pieces an hour. The wheel operated at a speed of 30,000 r.p.m.

Similar production rates and tolerances were obtained on two No. 72A internal grinders, one of Gage-Matic type and the other of Size-Matic type.

Close Accuracy in Boring

Of equal interest perhaps was the demonstration of several Bore-Matic precision hole finishing machines, which employ single-point diamond or carbide cutting tools and are designed to rough or finish bore straight, taper, blind or interrupted holes, and also turn and face where conditions permit. Close accuracy, with high production and fine finish, is obtained. These machines, described in previous issues, are hydraulically actuated and are built in a variety of models, single and double-end, to meet both small lot and high production requirements.

One of them was a single-end Bore-Matic, suitable for finishing parts made of bronze, aluminum, copper and fiber as well as of cast iron and steel. High speed permits a very light feed, which gives practically no deflection of the boring bar and work. In simultaneously finishing of bronze and cast-iron bushings, the holes in which were 1.3125 in. by 2 in. long, production was at the rate of 104 bushings an hour, stock removal being 0.010 in. Tolerance of 0.0002 in. is held on the diameter, and 0.0001 in. in the roundness and straightness respectively. Cutting speeds were: cast iron, 400 ft. per min.; bronze, 1000 ft. per min. Feeds were 0.006 in. and 0.0024 in.

A No. 48 Bore-Matic, a small machine featuring rapid and convenient set-up for small-lot work, as well as advantages for individual job use in production lines, was demonstrated in boring a 1.3125 x 11/16 in. long hole in a steel bushing of Rockwell C22 hardness. Stock of 0.010 in. was removed and production was at the rate of 120 pieces an hour. Tolerances were: diameter, 0.0002 in.; straightness and roundness, 0.0001 in. respectively. The cutting speed was 200 ft. per min., and the feed per revolution, 0.0053 in.

A double-end No. 46 Bore-Matic was also on view. This machine is a heavy unit and may be equipped with from one to four heads at each end. Where the work requires it, a double row of heads can be employed.

All styles of the Red Head series of boring and grinding wheel heads were displayed. These heads, brought out early last year, feature "super precision" ball bearings that are preloaded by springs, so that expansion and contraction due to heating cannot alter the loading, and wear is taken up as fast as it occurs. The wheelhead assembly and the bearing inspection departments were open to visitors. In the latter, the carefully made and checked bearings undergo additional inspection. Assembly and testing of the wheel heads themselves is in dust and dirt free rooms by skilled mechanics who do no other work.

Castings Development Discussed at Cleveland

PROGRESS in the development and application of gray iron, malleable and steel castings and the improvement of physical properties was discussed by three leaders in metallurgy and practice in the ferrous castings industry at a joint meeting on castings development held at the Hotel Statler, Cleveland, Jan. 31. There was an attendance of several hundred engineers and foundrymen. The speakers were Harry A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, who spoke on malleable iron; Fred J. Walls, metallurgist, Eaton-Erb Foundry Co., Vassar, Mich., who talked on gray cast iron, and Maj. R. A. Bull, foundry consultant, Chicago, whose subject was steel castings.

Much information of value to engineers in the choice of kind and grade of castings was brought out. That gray iron, malleable and steel castings are converging in their distinguishing physical characteristics as a result of new methods and alloying elements was pointed out by two of the speakers.

A brief review of the history of the malleable iron industry was given by Mr. Schwartz, who also discussed the practice and equipment used in that industry and the metallurgy of malleable iron and its physical properties. He showed by charts the changes in malleable specifications in the last 30 years and mentioned variations in malleable iron that have been effected by the introduction of alloying elements. Referring to the two largest users of malleable castings, he said that railroads insist on castings of a stronger material but the automotive industry calls for castings of only moderate strength and pays particular attention to the machineability of castings. It is not always good engineering, he said, to use the stronger material.

Alloy Castings

Mr. Walls pointed out that there have been great developments in alloy

cast iron and in heat treated castings in the past two or three years and he emphasized the importance of gray iron as an engineering material. The centrifugal and the permanent mold methods of making castings had also experienced a great development. An advantage of these casting processes is an increase in the density of the material. Foundry laboratories are able to recommend to engineers the kind of castings to use. He hoped that eventually iron would be graded according to its uses.

Automobile cam and crankshafts, boiler forming dies and other castings made of alloy cast iron were exhibited in slides. Iron having a molybdenum content for making brake drums has proved very satisfactory in recent experiments, he said. The advantage of using a content of 0.35 per cent molybdenum in cast iron is that it increases the physical properties. Quenching and drawing permanent mold castings offer many possibilities, in the opinion of the speaker.

Major Bull told of the extent of the steel casting industry and outlined its recent progress. It consists, he said, of about 275 plants with an average output of 25 to 7000 tons per month and an annual capacity of about 2,000,000 net tons. Steel castings are far more diversified in their physical properties than formerly, he pointed out. This, he said, was due to the development of the electric furnace, enabling foundrymen to use a small melting unit as compared with the open-hearth furnace and enabling them to produce castings of special grade in small lots that often are required by the customer. Steel castings are greatly diversified as to size, ranging from a fraction of a pound to castings requiring the iron from two 60-ton open-hearth furnaces.

Steel Castings

Speaking of the properties in steel castings he said that there are as many as 75 varieties in high and low alloy grades. One steel foundry produced 46 grades in December while operating at 30 per cent of capacity. Referring to the great development in alloy steel castings in the past ten years Major Bull said that developments in the welding of the rolled steel and in the gray iron practice in developing high strength iron have proved a stimulus to the development of steel castings, that the development of stainless steel has also stimulated low alloy steels and there has been a development in medium alloy steels.

There are now two grades of alloy structural steel covered by A.S.T.M. specifications. Consumers in private specifications have called for alloy steel castings with a tensile strength of as high as 200,000 lb. per sq. in., and a tensile strength of 225,000 lb. and higher has been shown in test bars. If engineers would cooperate with foundrymen regarding the physical requirements of castings, the latter, the speaker said, would be able to give sound advice as to the proper chemical analysis and grade of steel.

The quenching of high strength castings and complex heat treatment were among the important developments in the steel casting practice pointed out by Major Bull. He also stressed the importance of proper design of castings to get strength, toughness and serviceability, showing in lantern slides similar castings properly and improperly designed.

The meeting was sponsored by the American Foundrymen's Association, Cleveland Engineering Society, and the Cleveland Section of the American Society of Mechanical Engineers. Dan M. Avey, vice-president American Foundrymen's Association, presided.

To Administer Gray Iron Jobbing Code

EFFECTIVE Feb. 1, Henry M. Halstead, Jr., became executive vice-president of the Gray Iron Founders' Society, and, with Arthur J. Tuscany as executive secretary, will have charge of the administration and organization of the gray iron jobbing foundry industry under the code which is awaiting the President's signature. Mr. Halsted resigned his position as assistant deputy administrator of the NRA staff to assume his new position.

Mr. Halsted's business activity following his discharge from the navy in 1919 has been largely with the management and operation of manufacturing establishments in this country and abroad. During a period of five years he was in the New York office of the International Western Electric Co., the export subsidiary of the American Telephone & Telegraph Co., and in January, 1924, was assigned to Antwerp, Belgium, as production control manager. He completely revamped and reorganized the business and manufacturing procedure and during his first four years in Belgium, the factory increased its output 400 per cent with the personnel advancing from 2500 to 11,000. Early in 1930 he became associated with the European general staff as production supervisor responsible for production control work in all European plants of the company. The items manufactured covered telephone, radio, broadcasting, printing, telegraph, electric refrigeration, railway signaling and miscellaneous products.

In September, 1925, the International Western Electric Co. was purchased by the International Telephone & Telegraph Corpn. and the name was changed to International Standard Electric Corpn. Following his successful administration as a member of the general staff of the company, Mr. Halsted was made assistant to the vice-president in charge of European activities until 1932 when the European staff was abolished and supervision was established from the New York office. Mr. Halsted became connected with the NRA in Washington in August, 1933. He is 37 years of age and was graduated from Williams College, in 1918.

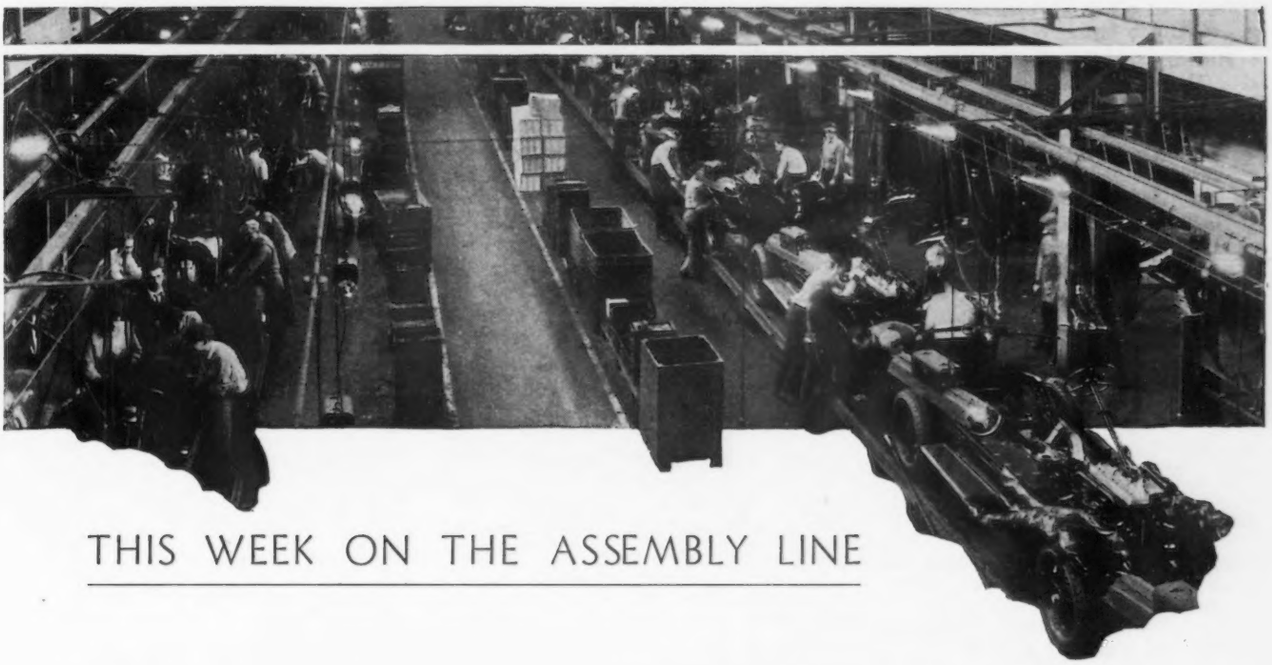
The offices of the Gray Iron Founders' Society will remain in Cleveland. Administration of the code in addition to the executive officers mentioned will be under general direction of eight members of the industry, six from the Gray Iron Founders' Society and two representing non-members. The code authority members elected by the Gray Iron Founders' Society include Franklin R. Hoadley, president, Gray Iron Founders' Society, Farrel-Birmingham Mfg. Co., Inc., Ansonia, Conn.; W. A. Rigsby, Lombard Iron Works & Supply Co., Augusta, Ga.; A. B. Root, Jr., Hunt-Spiller Mfg. Corpn., Boston; C. B. Magrath, North Western Foundry Co., Chicago; W. H. Winters, American Brake Shoe & Foundry Co., Pittsburgh; and George Branston, Campbell, Wyant & Cannon Co., Muskegon, Mich.

Metal Guard Fences for Pan-American Highway

THE Mexican section of the Pan-American highway will be completed late this year according to Angel Aragon, sub-director general of highways, of Mexico, who addressed the Pan-American division of the American Road Builders' Association which recently held its 31st annual convention at Chicago. As construction progresses there is an increasing disposition to use metal guard fences instead of the earlier idea of marking dangerous sections of the road with stones that were painted white.

Inland Steel Co. Made Profit Last Year

PRELIMINARY report of the Inland Steel Co. and subsidiaries, for the year ended Dec. 31, shows net income of $156,693 after interest, depreciation, depletion and other charges, equal to 14c. a share on 1,200,000 shares of capital stock outstanding. This compares with a net loss of $3,045,628 in the preceding year.



THIS WEEK ON THE ASSEMBLY LINE

Motor Car Makers Spend $2,000,000 For Machine Tools To Expand Output

DETROIT, FEB. 6.

THE best evidence of the automobile industry's confidence in the 1934 retail market for cars is not the issuance of publicity statements brimming over with optimism, but the willingness to spend money for new plant equipment to increase production and lower costs. This evidence was presented to the machine tool trade last Thursday and Friday in the form of orders for machinery totaling close to $2,000,000.

With a heavy schedule ahead which has not been remotely approached in volume since 1929, the Chevrolet gear and axle plant discovered that the only way in which it possibly could meet its obligations would be to add substantially to its machine tool facilities. Accordingly it has bought approximately 300 tools of a wide variety, including milling, grinding, drilling and boring equipment. The transmission plant of the Chevrolet company at Toledo, which makes all the transmissions for Chevrolet and Pontiac cars, also has purchased a large amount of machinery to give it a greater output.

Chevrolet's orders for Detroit and Toledo are roughly estimated to involve an expenditure of $1,500,000. It apparently has been decided by the Chevrolet management to keep production of front-end units and other major parts within the organization rather than attempt to farm out some of the work. It will be recalled that several weeks ago Chevrolet is reputed to have offered the Kelsey-Hayes Wheel Corpn. a contract to make half of its welded steel housings for its coil springs during 1934.

Chevrolet to Make More Parts at Bay City

Some of the smaller parts now being fabricated at the local Chevrolet plant are to be transferred to the Bay City, Mich., factory, which has been confining its manufacture to valves, tappets and screw machine parts. Chevrolet is asking for rush delivery of the machine tools ordered last week and hopes to have them ready for operation in three to four weeks. Meanwhile the gear and axle plant is said to have 125,000 units scheduled for Chevrolet and Pontiac in February, but it is believed that with present equipment this goal cannot be attained.

Chevrolet's assemblies in January were about 40,000 units. Production has risen rapidly the past week to 3300 units a day, five days a week. It is anticipated that output this month will run in the neighborhood of 80,000 units, although an attempt will be made to push the total up to 100,000. Chevrolet's payroll today stands at 53,203, compared with 33,727 a year ago. This is the highest employment figure since the spring of 1929 and does not include employees of the Fisher Body Corpn. working on Chevrolet bodies.

The Saginaw Steering Gear Division of General Motors likewise has been a buyer of a considerable number of new machine tools the past week, although its total outlay for this purpose is not known. Here again the necessity for increasing operations sharply was the reason for this capital investment.

Chrysler Places Large Machine Tool Orders

With the same suddenness as Chevrolet and Saginaw Steering Gear, the Chrysler Corpn. stepped into the machine tool market last Thursday and bought $250,000 to $300,000 worth of equipment for its local Jefferson Avenue plant. It is understood that this machinery is to be used in connection with the manufacture of front-end units for Plymouth, Dodge and the Chrysler six. The bottleneck in Chrysler production today is said to be its Newcastle, Ind., plant, where front-end parts and assembled units are turned out. Difficulties are reported to have arisen at Newcastle so that it became advisable to ship parts to Plymouth and Dodge at Detroit, where they were assembled. The Chrysler management is understood to be engaged now in trying to untangle the production knot at Newcastle. Assembly of front-end units at the Jefferson Avenue plant in this city will relieve the situation. There is considerable talk about the possible

transfer of all the present operations at Newcastle to Detroit.

Machine tool orders placed by General Motors and Chrysler were well distributed among various machine tool centers. Buick still is purchasing a few tools for its small car program, and Ford is reported to have bought a few single machines.

The rapid increase in motor car assemblies the past week makes necessary an upward revision of the production volume for the first quarter. General Motors will make at least 100,000 cars this month, according to William S. Knudsen, executive vice-president. Ford is planning on 70,000 jobs as a minimum, and Chrysler 50,000. These three leaders alone therefore will account for 220,000 cars during February, thereby assuring a total of 250,000 units or more for the entire industry.

First Quarter Output Estimated at 700,000 Units

Mr. Knudsen states that General Motors will turn out 130,000 cars in March. A conservative estimate for Ford would be 75,000 units. Chrysler should climb to 70,000, since it has a goal next month of 90,000 at which it is aiming. At that rate March should witness an output of 300,000 units, with a good chance that the figure will be nearer 350,000. With January at 150,000 units, February at 250,000 and March at 300,000, the first quarter total will be 700,000 units, which is regarded as a conservative estimate. This compares with 368,106 in the first quarter of 1933, 373,247 in 1932, 697,553 in 1931 and 1,046,689 in 1930.

The way in which automobile companies are releasing steel gives support to a notable expansion in motor car output during the remainder of the current quarter. Although the threat of higher prices on sheets and strip steel is playing a part in forcing in steel tonnages, the matter of securing deliveries still is the dominant motive. Deliveries of certain full-finished sheet items, particularly wide sheets, have lengthened out to six weeks, and the limited capacity of the sheet industry in wide sheets is causing automobile companies much anxiety.

The Newton Steel Co. is said to be preparing to open again its Newton Falls, Ohio, mill chiefly to help meet the needs of General Motors divisions for wide cold-rolled sheets. With the wide skirts and sweeping one-piece fenders which have come into vogue, as well as the practice of making rear fenders out of a single wide sheet which is split into the right and left fender after the stamping operation, the demand for wide sheets has grown to very large proportions almost overnight.

The bulk of the steel business placed in the last two weeks has been in sheets and cold-rolled strip steel, as the leading automobile companies still have fairly good inventories of forging steel and hot-rolled strip. Several of the smaller sheet mills are sold out for the balance of this quarter, and a large sheet manufacturer is booking business at 100 per cent of capacity. However, its orders have not been well enough balanced that it can operate all of its mills at full capacity. The local steel trade expects the present steady demand to continue during the next 30 days.

Chevrolet's action in reducing its tonnage to large steel makers and distributing it among numerous small mills has excited local steel circles. This matter is discussed in a special article in this issue on page 37.

Pontiac made about 6000 cars in January. It has 12,000 projected for this month and 18,000 for March. Olds Motor Works, which has been held back by the lack of dies for its low-price six, hopes to get 10,000 units in February. Buick has a similar total planned for the current month. Cadillac-LaSalle, which manufactured about 6600 cars in 1933, already has bought materials for twice that number in 1934, and it would not be surprising if its total this year would be as high as 25,000 cars.

Chrysler Has Backlog of 90,000 Orders

Plymouth is up to 1350 cars a day, but has been delayed by a shortage of bodies. It intends to reach its maximum of 2000 cars a day as soon as possible. Dodge likewise is expanding at a good rate. The first Airflow Chrysler came off the line Friday. Small quantities of DeSotos and Chryslers now are being assembled. The Chrysler Corpn. has a backlog of 90,000 orders for its various cars. Advance orders on hand for the Airflow De Sotos and Chryslers are reported of sufficient volume to take the factory output until the end of April. The bank of orders for the Chrysler car alone totals 10,074 units, the largest number since September, 1928.

Ford is said to be averaging slightly under 4000 units a day at the Rouge plant, with production departments being prodded by the sales department for more cars. Ford is understood to be preparing to light its second blast furnace, which would seem to be a forerunner of increased steel and foundry operations at Dearborn.

Packard is assembling about 100 cars a day. Studebaker has resumed work at South Bend after a short shutdown. Hudson-Terraplane is increasing output substantially, having added 3000 men to its force in the past week. Its present payroll consists of 11,000 men.

The smaller independent companies, such as Graham, Hupmobile and Reo, are stepping up production above original schedules. Willys-Overland this month will resume manufacture under a court order to its receivers, employing 600 men at its Elmira, N. Y., plant, 600 at the Wilson foundry at Pontiac, Mich., 250 at its Los Angeles assembly plant and 1050 at the main plant at Toledo.

Manufacturers of forged and cast automotive parts are feeling not only the expected demand, but also an overflow volume of business from the large motor car companies. Several foundries, for instance, have considerable Chrysler work. Chevrolet has sent out inquiries for prices on small forgings which it has long made in its own plants.

Detroit Notes

C. L. McCuen, president of Olds Motor Works, says that Olds production this year probably will exceed the 100,000 units set up as its goal. Orders on hand for the Olds eight are equal to half of the 1933 output. . . . Manufacturing production and service machinery for grinding hardened valve seats, the Hall Mfg. Co., Toledo, has contracts which will keep it running at capacity for two years. It has large orders from Ford, Citroen and Renault in France, and Daimler-Benz in Germany. . . . January orders of the Ex-Cell-O Aircraft & Tool Corpn., Detroit, were the largest ever received in a single month. . . . The improvement in Detroit is reflected in the welfare load which is now 24,875 families, the lowest number since the depression started. As recently as Nov. 29 it was 48,940 families. A combination of CWA and industrial reemployment wrought the miracle.

Industrial employment in Detroit on Jan. 31 stood at 83.2 according to the index of the local Board of Commerce. This is the highest point reached since May 1931, when the index stood at 84. It compares with the 1933 high mark of 64.7 in Aug. and with the highest point on record of 137.8 in March 1929.

Additional Stainless Steel Prices Filed

THE following new stainless steel prices have been filed, effective Feb. 10:

	Base Price per Lb., Pittsburgh
Carbon 0.08— 0.20 per cent Chrome 9.0 —12.0 per cent Silicon 0.50— 3.50 per cent	
Hot-rolled strip	15c.
Cold-rolled strip	20½c.
Carbon 0.08— 0.20 per cent Chrome 12.0 —15.0 per cent Silicon 0.50— 3.50 per cent	
Hot-rolled strip	16c.
Cold-rolled strip	22c.

New base prices on stainless steel bars, sheets and plates (carbon, 0.20 per cent maximum; nickel, 12 to 14 per cent; manganese, 5 to 7 per cent; and chrome, 1 per cent maximum), which were published in THE IRON AGE of Feb. 1, page 52, were withdrawn, effective Jan. 31.

... PERSONALS ...

ARTHUR H. YOUNG has been appointed vice-president in charge of industrial relations of the United States Steel Corpn., with headquarters at New York. This position is a newly created one. Mr. Young has had a long career in the industrial relations field, especially in the steel industry. His experience has given him first-hand knowledge of the points of view of both workmen and employers. His first contact with the iron and steel industry was as a worker and after he rose to supervisory positions his duties continued to keep him in intimate touch with workmen and their problems. As a boy, he entered the employ of the Illinois Steel Co., at Joliet, Ill. From there he went to the Minnequa plant of the Colorado Fuel & Iron Co., Pueblo, Colo., and in 1905 returned to the Illinois Steel Co., taking a position of timekeeper at its South Chicago works. He was subsequently chief payroll clerk, statistician, assistant supervisor of labor, chief safety inspector and supervisor of labor and safety. In 1917, Mr. Young left the Illinois Steel Co. to become director of the American Museum of Safety and served as the Government's chief safety expert during the war. From July 1, 1918, to July 1, 1924, Mr. Young was manager of industrial relations at the International Harvester Co., Chicago. He was a co-author of the Harvester Industrial Council Plan and was responsible for the administration of this significant development in employee representation. In July, 1924, Mr. Young became industrial relations counsel for the law firm of Curtis, Fosdick & Belknap, New York. Since May, 1926, he has directed the activities of the Industrial Relations Counselors, Inc., New York.

A. H. YOUNG

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H. J. FREYN, whose election to the chairmanship of the board of the Freyn Engineering Co., Chicago, was announced in these columns a week ago, has been president of the company since it was founded. WYMAN EATON, the new president, became associated with the company in 1919 as chief engineer, and was later made vice-president and general manager. Mr. Eaton began his career in the steel industry in 1902 with Julian Kennedy, specializing in blast furnace and rolling mill design. He subsequently joined the engineering department of the Youngstown Sheet & Tube Co. and William Tod Co., both of Youngstown. In 1915 he became connected with the Mesta Machine Co. and for four years was in charge of its rolling mill department.

GORDON FOX, who has been identified with the power and electrical activities of the Freyn company and who has spent the last five years largely in the U. S. S. R., has been named a vice-president. He is a graduate of the University of Wisconsin and has been with the company since 1920.

H. J. FREYN

W. EATON

ALFRED J. EBNER, who has been made a vice-president, has been with the Freyn organization since 1916 and has been associated with its activities in the blast furnace and open-hearth fields. He was graduated from Armour Institute of Technology in 1909, and was successively with the National Malleable Castings Co. and the American Steel Foundries Co.

WALTER G. TUCKER, heretofore president of the Hydraulic Press Mfg. Co., has been made chairman of the board. FRANK B. MACMILLIN, who has been actively engaged in the management of the company for 32 years, most of that time as executive vice-president, has been elected president and general manager. His son, HOWARD F. MACMILLIN, who joined the company in 1921 and who has been vice-president in charge of sales, has been made vice-president and assistant general manager.

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PAUL W. LYON, for a number of years associated with the tin plate division of the general sales department of the American Sheet & Tin Plate Co., Pittsburgh, has been appointed assistant manager of the tin plate sales division of the Wheeling Steel Corpn., and will be located at the general offices at Wheeling, W. Va.

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A. G. PRATT, president of the Babcock & Wilcox Co., has been made a director of the Worthington Pump & Machinery Corpn., Harrison, N. J.

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A. S. HELLSTROM has been appointed sales representative of the Bantam Ball Bearing Co., South Bend, Ind., in the Youngstown, Cleveland and Wheeling districts, with headquarters at 1625 Ohio Avenue, Youngstown. He will give special attention to sales of bearings for steel mills and rolling mill equipment. He has recently returned from Siberia, where he assisted in the design and erection of a Soviet steel plant.

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WALTER GEIST, general representative in charge of the sales organization, Allis-Chalmers Mfg. Co., Milwaukee, will sail for Europe on Feb. 15 for a three months' sojourn.

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A. B. CLARK has been appointed general traffic manager of the operating companies of Union Carbide & Carbon Corpn., New York. Mr. Clark, who is well known in traffic circles throughout the country, succeeds the late Herbert Thompson. He has been with the corporation 17 years.

... OBITUARY ...

JAMES HARTNESS, who retired as president of the Jones & Lamson Machine Co. last year, died at Springfield, Vt., on Feb. 3. He was born at Schenectady, N. Y., Sept. 3, 1861, and became associated with the Jones & Lamson company in 1889, first as superintendent, then as manager and finally as president, holding the latter office 32 years. He was a patentee of more than 100 inventions, including the flat turret lathe, a screw thread comparator, an automatic die head and an equatorial telescope. Mr. Hartness received honorary degrees from the University of Vermont and Yale University and was recipient of both the John Scott and Edward Longstreth medals. During the war he represented the United States at the inter-allied aircraft standardization conferences at Paris and London, and also served as Food Administrator for Vermont and as chairman of the Committee for Public Safety for that State. After the war, from 1921 to 1923, Mr. Hartness was Governor of Vermont. In 1914 he was president of the American Society of Mechanical Engineers and in 1918 he served as a vice-chairman of the National Screw Thread Commission. He was also a past president of the American Engineering Council, succeeding former President Hoover in that post. Mr. Hartness was a fellow of the American Society for the Advancement of Science and of the Royal Astronomical Society, as well as a member of many societies and scientific organizations. He was also the author of several books, including: "Evolution of the Machine Shop," "Machine Building for Profit," and "The Human Factor in Works Management."

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HARRY G. CHAPMAN, vice-president and general manager of the Cyclone Fence Co., a subsidiary of the United States Steel Corpn., died suddenly on Jan. 30 in the William Penn Hotel at Pittsburgh where he had gone on a business trip. Mr. Chapman was 49 years old and made his home at Waukegan, Ill. He was in the service of the fence company for 15 years and last year was promoted to the post of vice-president and general manager from that of general sales manager.

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RAYMOND H. ALLEN, a pioneer in the automobile industry, died on Jan. 26 in Clermont, Fla., where he was spending the winter. He was director of purchases for Dodge Brothers Corpn. immediately following its formation, and during the war had charge of the ordnance plant of the Dodge company. During his business life he also was with General Motors Corpn. in an executive capacity and with the Packard Motor Co. at Warren, Ohio.

James Hartness

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HARRY H. WYATT, vice-president of the Detroit Alloy Steel Co. and secretary-treasurer of the Detroit Gray Iron Foundry Co., Detroit, died at his home on Jan. 28. He was born in Warwick, England, 48 years ago and came to this country at an early age. He received his schooling in Omaha, Neb., and went to Detroit in 1906. He became identified with the Detroit Gray Iron Foundry Co. in 1918.

H. G. Chapman

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WILLIAM CROSBY MARSHALL, for three years associated with the Berlin Iron Works, research engineer for the Union Metallic Cartridge Co., trade commissioner in Italy for the Bureau of Foreign and Domestic Commerce, and for 16 years an instructor at Yale University, died Thursday, Feb. 1, at Wallingford, Conn. He was born at Avon, Conn., 63 years ago.

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HENRY BAETZ, inventor of heating apparatus, died in St. Louis on Jan. 30, of heart disease. He was born in Two Rivers, Wis., 69 years ago, and went to St. Louis about 40 years ago. In 1898 he founded the St. Louis Blower & Heater Co., which he headed until 1914, when he sold his interests to the Skinner Brothers Mfg. Co.

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MARSHALL G. SPENCER, vice-president and general manager of the Electric Steel Castings Co., Speedway, Ind., Indianapolis suburb, died in Speedway, Jan. 24, aged 45 years. He had long been prominent in the steel industry. He was first affiliated with the Midvale Steel Co., Philadelphia, with which he remained until 1917 and during the next two years was with the Ordnance Department at the Watertown Arsenal. In 1919 he became affiliated with the Electric Steel Castings Co. He was known throughout the castings industry as an authority on foundry problems, melting practice and heat treatment. Mr. Spencer was a member of the American Society for Steel Treating and had long been prominent in the activities of the Indianapolis chapter. He was also a member of the American Institute of Mining and Metallurgical Engineers and recently had been active in the establishment of a chapter of that institute in Indiana.

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D. W. RICH, for three years manager Park Works, Crucible Steel Co. of America, Pittsburgh, died suddenly in that city on Feb. 2. He had been identified with the Crucible company and its subsidiaries for many years, having gone to Park Works from the superintendency of finishing mills at the Midland, Pa., plant of Pittsburgh Crucible Steel Co.

New Prices Filed on Drawn Wire

THE following prices have been filed, effective Feb. 10:

	Base Price per 100 Lb., Worcester
White liquor finish needle bar	$7.00
Ring traveler wire.....	9.10

New Commercial Resolutions and Amendments Become Effective

NUMEROUS amendments to existing commercial resolutions and several entirely new resolutions have been put into effect under the iron and steel code. In substance, they are as follows:

Railroad Resolution Amended

An amendment of commercial resolution No. 38, which in turn was an amplification of resolution No. 29, has been adopted effective Feb. 2, and is clearly intended to overcome a technical difficulty which arose when bids for steel for the Pennsylvania Railroad were asked by two individuals rather than by the road itself. The amendment authorized members of the code to use the same system of computing mileage allowances now used in connection with railroad sales, in quoting a trustee, mortgagee or lessor, purchasing material for equipment to be used by a railroad. This can be done, however, only when it is understood that the road will ultimately become the owner of the equipment.

* * *

Sales to Frog and Switch Manufacturers

Commercial resolution No. 45, effective Feb. 2, is an amplification of commercial resolution No. 33, adopted Nov. 15, 1933, which provides that rails and track supplies sold prior to March 1, 1934, may be shipped until June 30, 1934. The same extension of time is granted under resolution No. 45 on sales of rails and other rolled steel products to manufacturers of railroad frogs, switches and other special track work.

* * *

Truck Deliveries

Commercial resolution No. 16, dealing with the delivery of products by truck at places not reached by all-rail transportation, has been amended as follows: For deliveries by truck within the switching limits of any city or town, not less than 50c. a ton shall be added to the delivered price. For delivery to a point not located within the switching limits of any city or town, or to any place in the city of New York, not less than $1 a ton shall be added to the delivered price.

* * *

Pig Iron Prices in St. Louis Territory

Commercial resolution No. 47 was adopted to take care of a situation which arose because of the failure of the pig iron producer at Granite City, Ill., to file a base price with the American Iron and Steel Institute. Under the code pig iron makers are permitted to meet recognized base prices at other basing points, but they are not allowed to make any other deductions from their f.o.b. furnace prices. The resolution authorizes any pig iron producer to deduct $2 a ton from the Chicago basing point price in competing for business in St. Louis territory. This authorization will terminate on July 31, 1934.

* * *

Amendment Covering Sale of Southern Iron

Commercial resolution No. 10, covering the sale of Southern pig iron in the North, has been amended to restrict price differentials to Southern iron containing not less than seven-tenths to 1 per cent of phosphorus. Heretofore, Southern iron of any analysis could be sold in the North at prices equal to 38c. a gross ton less than the nearest Northern basing point price, plus the freight to the point of delivery.

* * *

Bar Extras in Mountain States

Since purchasers of merchant steel bars in Colorado, Montana, New Mexico, Utah and Wyoming customarily buy in very small quantities of one size, the application of the steel code's uniform extras for lots of less than 2000 lb. has proved onerous and likely to lead to conditions of unfair competition. Consequently the following resolution, No. 46, has been adopted under the code, effective Feb. 2 and expiring April 30, by which time further study of the problem may suggest a more satisfactory solution:

RESOLVED that, effective immediately and to and including April 30, 1934, the following quantity differentials or lump sum extras be, and they hereby are, approved on sales of merchant steel bars for delivery at places in the states of Colorado, Montana, New Mexico, Utah and Wyoming:

On quantities less than 2000 lb. but not less than 1000 lb., 25c. per 100 lb.; on quantities less than 1000 lb., 50c. per 100 lb.

* * *

Prices to Manufacturing Users of Tubular Products

Commercial resolution No. 27 relating to deductions from base prices of tubular goods in sales to certain manufacturers has been amended, effective Feb. 9. Originally the resolution applied only to steel tubular products but it has now been extended to cover both iron and steel. In its first version, the resolution provided that, in the case of standard pipe, water-well casing, rigid electrical conduit pipe and/or large OD pipe sold to manufacturers for use in making pipe nipples, fire protection sprinkler systems, ice machines, refrigerating systems and/or rigid conduit, or for the fabrication of power piping, deductions could be made from published base prices not exceeding deductions allowed to jobbers. Also, that an additional deduction could be made to a manufacturer of rigid conduit not exceeding the amount of the approved extras for cutting pipe to a single conduit length and for threading and coupling such pipe.

These provisions have not been changed but they are conditioned by a proviso that before any deductions are allowed the purchaser must agree in writing that the products bought will be used only for the particular purposes listed above. In any case where tubular products purchased under these terms are used for other purposes, the buyer is subject to penalty of $10 a ton.

* * *

Sales of Tubular Products to Competitors

Commercial resolution No. 42 has been amended, effective Feb. 9. This resolution authorizes manufacturers of tubular products to make sales to competitors to permit the latter to fill out their lines. Such sales can be made at a discount of 5 per cent plus any deductions from the base price allowed to jobbers. The amendment adds a stipulation that where tubular products are sold to another manufacturer for sale in less-than-carload quantities, a further allowance be made equal to the difference between the carload base price of the manufacturer and the less-than-carload price.

P.W.A. Approves More Railroad Loans

WASHINGTON, Feb. 6.—The Public Works Administration today announced that contracts had been signed covering a loan of $1,400,000 to the Chicago & North Western Railroad and a loan of $240,000 to the Chicago & Eastern Illinois Railroad.

Purchases to be made by the Chicago & North Western include 26,000 tons of rails, 1460 tons of rail joints, 1066 pairs of insulated joints, 4000 tons of tie plates and 730 tons of track spikes, 181 tons of track bolts, 175,000 nutlocks and 100 switches.

Purchases to be made by the Chicago & Eastern Illinois include 4000 tons of rails, 1000 tons of tie plates, 65 tons of track spikes, 30 tons of track bolts, 4841 ordinary rail joints and 69,584 rail anchors.

Air Reduction Co. Acquires Wilson Welder

ON Jan. 1, 1934, the Air Reduction Co., Inc., exercised its option on the balance of the capital stock of the Wilson Welder and Metals Co., of North Bergen, N. J. Air Reduction thus becomes the first of the oxy-acetylene welding companies to own a 100 per cent interest in an electric welding organization.

Scrap at Detroit

DETROIT, Feb. 6.—With demand for scrap steel mills increasing, prices of steel items have advanced 25c. to 50c. a ton. Heavy melting steel is up 50c. but still is lagging behind hydraulic bundles, because of the local steel plant's preference for the latter. A scarcity of cast iron grades has had the effect of boosting quotations which long have been virtually stationary. The Detroit steel maker is taking scrap freely on current contracts. Because steel scrap is now coming out in much greater quantities than district users can absorb it, shipments to other steel-making centers are expected to increase sharply later this month.

The following price has been filed with the American Iron and Steel Institute, effective Feb. 5: Half-round wire and oval wire, $3.60 per 100 lb., f.o.b. Pittsburgh.

Imports of Iron and Steel Higher as Year Ended

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	December		Tweve Months Ended December	
	1933	1932	1933	1932
Pig iron	15,531	14,244	158,630	130,630
Sponge iron	....	22	619	185
Ferromanganese and spiegeleisen*	4,123	999	59,340	22,754
Ferrochrome†	....	42	24	210
Ferrosilicon‡	62	5	875	53
Other ferroalloys	....	36	102	709
Scrap	396	....	57,040	9,775
Pig iron, ferroalloys and scrap	*20,112*	*15,348*	*276,630*	*164,316*
Steel ingots, blooms, etc	101	86	1,039	2,395
Wire rods	1,143	1,149	13,341	7,934
Semi-finished steel	*1,244*	*1,235*	*14,380*	*10,329*
Concrete reinforcement bars	116	905	2,633	27,177
Hollow steel bars	102	73	970	899
Merchant steel bars	2,082	1,711	20,844	31,102
Iron bars	60	44	499	480
Iron slabs	....	3	1	21
Boiler and other plate	3	1	237	419
Sheets, skelp, and saw plate	723	1,262	9,300	21,830
Tin plate	28	1	260	7,247
Structural shapes	2,323	4,166	29,129	36,545
Sheet piling	....	....	166	1
Rails and rail fastenings	103	245	6,404	5,663
Welded pipe	260	361	4,149	4,458
Other pipe	326	130	2,334	2,482
Barbed wire	1,385	521	8,301	14,541
Round iron and steel wire	192	105	3,146	1,883
Flat wire and strip steel	134	91	1,326	1,490
Wire rope and strand	201	146	1,672	1,804
Other wire	111	123	1,614	1,212
Hoops and bands	1,267	1,777	21,296	31,980
Nails, tacks and staples	324	1,051	6,469	10,874
Bolts, nuts and rivets	27	26	276	248
Other finished steel	8	32	378	182
Rolled and finished steel	*9,775*	*12,774*	*121,404*	*202,538*
Cast iron pipe and fittings	....	....	910	249
Castings and forgings	179	33	1,466	982
Total	31,310	29,390	414,790	378,414

*Manganese content only.
†Chromium content only.
‡Silicon content only.

Exports of Iron and Steel from the United States

(In Gross Tons)

	December		Tweve Months Ended December	
	1933	1932	1933	1932
Pig iron	448	71	2,754	2,324
Ferromanganese	5	5	44	33
Scrap	100,983	30,172	781,349	227,522
Pig iron, ferroalloys and scrap	*101,436*	*30,248*	*784,147*	*229,879*
Ingots, blooms, billets, sheet bars	150	7	3,159	1,627
Skelp	532	167	23,260	25,465
Wire rods	3,210	1,103	16,877	14,813
Semi-finished steel	*3,892*	*1,277*	*43,296*	*41,905*
Steel bars	3,095	1,432	22,251	15,371
Alloy steel bars	443	74	1,797	1,621
Iron bars	104	29	675	616
Plates, iron and steel	3,343	977	15,134	11,364
Sheets, galvanized steel	7,031	1,510	52,694	25,511
Sheets, galvanized iron	162	88	1,162	1,412
Sheets, black steel	4,160	2,306	37,078	38,277
Sheets, black iron	212	76	2,751	2,462
Hoops, banks, strip steel	1,871	892	20,252	17,778
Tin plate; terne plate	18,971	4,118	95,238	39,603
Structural shapes, plain material	1,048	637	14,203	14,885
Structural material, fabricated	3,022	800	16,536	16,206
Tanks, steel	687	365	3,078	3,053
Steel rails	9,102	361	41,880	11,344
Rail fastenings, switches, frogs, etc	4,131	136	13,536	3,742
Boiler tubes	341	300	3,927	3,681
Casing and oil line pipe	5,729	501	40,675	17,872
Pipe, black and galvanized, welded steel	4,012	2,196	34,328	27,094
Pipe, black and galvanized, welded iron	112	213	1,444	3,794
Plain wire	3,346	731	21,940	8,391
Barbed wire and woven wire fencing	3,545	1,348	29,905	17,832
Wire cloth and screening	98	43	722	635
Wire rope	232	123	2,215	1,575
Wire nails	1,115	701	10,251	7,552
Other nails and tacks	371	311	3,964	3,378
Horseshoes	4	2	144	100
Bolts, nuts, rivets and washers, except track	441	307	3,686	2,714
Rolled and finished steel	*76,728*	*20,577*	*491,866*	*297,863*
Cast iron pipe and fittings	475	473	11,594	8,410
Malleable iron screwed fittings	237	136	2,500	1,677
Car wheels and axles	479	243	4,940	2,884
Iron castings	567	564	4,205	3,397
Steel castings	71	69	956	1,173
Forgings	323	226	3,148	3,689
Castings and forgings	*2,152*	*1,711*	*27,343*	*21,230*
All other	377	324	4,040	3,773
Total	184,585	54,137	1,350,692	594,650

THE iron and steel import trade of the United States ended the year (1933) with an upward movement, total receipts of these products climbing 2331 gross tons to 31,310 tons in December according to *Commerce Reports*, Feb. 5. For the most part the trade in individual items showed little change from November, but notable increases occurred in receipts of pig iron (11,452 tons) and in barbed wire (996 tons), while the decreases in ferro-manganese (5668 tons) and in scrap iron and steel (2539 tons) were instances of outstanding reductions. The Netherlands, British India, Canada, and Germany were the principal participants in the December trade in that order.

Imports over the 12 months—414,790 tons in all—were 36,376 tons greater than in 1932, 1933 thereby becoming the first year since 1928 to show a gain over its predecessor. The trade, analyzed by products, was equally divided between increases and reductions with 17 of each. Among those registering gains were scrap (47,265 tons), ferro-manganese (36,586 tons), pig iron (28,000 tons), and wire rods (5407 tons), while outstanding among those decreasing were concrete reinforcing bars (24,544 tons), sheets (12,530 tons), hoops and bands (10,684 tons), merchant steel bars (10,258 tons), shapes (7416 tons), barbed wire (6240 tons), and nails (4405 tons). Leading suppliers of iron and steel in 1933 were Canada, India, the Netherlands, Belgium, Germany, and Norway in that order—shipments from Canada (114,929 tons) being greater by 84,466 tons, those from India (68,036 tons) by 39,216 tons, those from Norway by 16,246 tons, and those from Sweden 9168 tons. All other leading participants in this trade saw their shipments greatly curtailed in 1933 including Belgium (whose trade was smaller by 33,005 tons), the United Kingdom (28,151 tons), Germany (21,934 tons), France (20,246 tons), and the Netherlands (11,425 tons).

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	December		Twelve Months Ended December	
	1933	1932	1933	1932
United Kingdom	100	5,861	5,495	23,378
British India	6,936	1,435	68,036	28,670
Germany	....	....	234	361
Netherlands	7,373	6,639	65,538	74,372
Canada	767	....	12,259	2,113
France	....	97	....	97
Belgium	125	....	125	200
Norway	....	....	806	138
Sweden	230	114	3,435	561
All others	....	98*	2,702	740
Total	15,531	14,244	158,630	130,630

*Imported from Japan.

Railroad and Automobile Buying Give Market Added Buoyancy

Van Sweringen Equipment Order Will Supply Needed Tonnage In Heavy Products—Automotive Releases Mounting

MOUNTING demands from the automobile industry and the railroads have given the iron and steel industry a buoyancy that it has not possessed since last summer. Business is still unevenly distributed, but this is due to the current preponderance of orders for light rolled products and has nothing to do with the disgruntled attitude of certain motor car builders toward the steel code. It is now clear that the real reason the automobile industry has been spreading its steel orders among a larger number of mills is that it wishes to guard against delays in delivery. Certain strip and sheet mills are already solidly booked for the quarter and others are rapidly reaching the same condition.

The continued inactivity in heavy rolled products, especially evident in Pittsburgh where operations have receded from 21 to 20 per cent of capacity, will soon be brought to an end with the placing of steel for the 12,725 freight cars, 159 passenger cars, 20 locomotives and 20 extra tenders just bought by the Van Sweringen lines. These equipment orders were widely distributed geographically and the steel requirements for the freight cars alone are estimated at 175,000 tons.

The Pennsylvania has taken bids on about 25,000 tons of steel for freight cars which it will construct in its own shops.

RAIL orders, despite reassuring advices from Washington, are still slow in materializing. The Southern Pacific has closed for 40,000 tons, but the Chicago & North Western, which had originally intended to buy 65,000 tons, may not place more than 25,000 tons. Chicago rail mills, heretofore idle, have gone into production, but on light schedules. Producers are commencing to fear that even if promised rail orders are finally placed, there will not be enough remaining time to roll and ship them before the expiration date for the present price, which is June 30.

Makers of the heavier finished products continue to pin their hopes on public works projects, not unmindful of the fact that current delays may prove to their advantage by bringing them tonnage later in the year when their mill operations may be on a more economical basis. Structural steel awards of the week are light, amounting to only 9850 tons compared with 18,800 tons a week ago.

THE general upward trend in steel demand, and especially the increasingly tense situation in sheets and strip steel, have caused buyers generally to take renewed interest in the market. Concern about deliveries has caused some consumers to place protective orders, and others have been influenced to take such action by fear of labor difficulties in the steel industry. In fact, buyers have shown greater alarm over the President's order covering employee elections than steel producers themselves.

Fear of possible price advances has become a secondary consideration. But entirely aside from that fact, some producers are showing an increasing disinclination to raise prices lest the current buying movement might be checked. The attitude of the automobile industry may also account for a more cautious attitude on prices, despite the fact that current quotations on certain finishes of sheets and strips are unquestionably below the cost of production. But the complaints of motor car builders regarding steel prices are by no means accepted as justified. The increased cost of iron and steel per car, as compared with a year ago, does not exceed $11, which compares with average advances of $70 or more per car in retail prices.

WHILE the week has brought out no general price revisions in iron and steel, hot-rolled strip has been reduced to 1.80c. a lb., Chicago, cutting the differential over the Pittsburgh base to only $1 a ton.

Scrap is quiescent but has a stronger tone than a week ago, and THE IRON AGE composite price is unchanged at $11.92 a gross ton. The pig iron and finished steel composites are also unaltered at $16.90 a gross ton and 2.028c. a lb. respectively.

Both pig iron and steel production were larger in January than in December, the rate of pig iron output gaining 2.8 per cent and steel rising 1.6 per cent. January pig iron production was 1,215,226 tons, or 39,201 tons daily, as compared with 1,182,079 tons, or 38,131 tons a day, in December. On Feb. 1 there were 87 furnaces in blast, a gain of 12 in the month.

The rising tendency in steel output is becoming more pronounced this month. Except for the decline at Pittsburgh, operations have moved upward or held their own, the national average now being 38 per cent as against 35 per cent a week ago. Chicago is up five and one-half points to 36 per cent, the Valleys seven points to 42 per cent, Cleveland four points to 58 per cent, Buffalo six points to 38 per cent and the Philadelphia district one point to 24 per cent.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Feb. 6, 1934	Jan. 30, 1934	Jan. 9, 1934	Feb. 7, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$19.26	$19.26	$19.26	$13.34
No. 2, Valley furnace	17.50	17.50	17.50	14.50
No. 2 Southern, Cin'ti	18.13	18.13	18.13	13.82
No. 2, Birmingham†	13.50	13.50	13.50	11.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	15.50
Basic, del'd eastern Pa.	18.76	18.76	18.76	13.50
Basic, Valley furnace	17.00	17.00	17.00	13.50
Valley Bessemer, del'd P'gh.	19.76	19.76	19.76	16.89
Malleable, Chicago*	17.50	17.50	17.50	15.50
Malleable, Valley	17.50	17.50	17.50	14.50
L. S. charcoal, Chicago	23.54	23.54	23.54	23.17
Ferromanganese, seab'd carlots	85.00	85.00	85.00	68.00

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	32.00	32.00	32.00	30.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	31.00
Wire rods, Pittsburgh	36.00	36.00	36.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.75	1.75	1.75	1.60
Bars, Chicago	1.80	1.80	1.80	1.70
Bars, Cleveland	1.80	1.80	1.80	1.65
Bars, New York	2.08	2.08	2.08	1.95
Plates, Pittsburgh	1.70	1.70	1.70	1.60
Plates, Chicago	1.75	1.75	1.75	1.70
Plates, New York	1.98	1.98	1.98	1.698
Structural shapes, Pittsburgh	1.70	1.70	1.70	1.60
Structural shapes, Chicago	1.75	1.75	1.75	1.70
Structural shapes, New York	1.95¼	1.95¼	1.95¼	1.86775
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	1.70
Hot-rolled strips, Pittsburgh	1.75	1.75	1.75	1.45
Cold-rolled strips, Pittsburgh	2.40	2.40	2.40	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.25	2.00
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.00
Sheets, galv., No. 24, P'gh	2.85	2.85	2.85	2.50
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	2.60
Hot-rolled sheets, No. 10, P'gh	1.75	1.75	1.75	1.45
Hot-rolled sheets, No. 10, Chicago dist. mill	1.85	1.85	1.85	1.55
Wire nails, Pittsburgh	2.35	2.35	2.35	1.80
Wire nails, Chicago dist. mill	2.40	2.40	2.40	1.85
Plain wire, Pittsburgh	2.20	2.20	2.20	2.10
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.15
Barbed wire, galv., Pittsburgh	2.85	2.85	2.85	2.30
Barbed wire, galv., Chicago dist. mill	2.90	2.90	2.90	2.35
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.25	$13.25	$12.50	$8.50
Heavy melting steel, Phila.	11.75	11.75	11.75	6.75
Heavy melting steel, Ch'go	10.75	10.75	10.50	5.25
Carwheels, Chicago	11.00	11.00	10.50	7.50
Carwheels, Philadelphia	12.75	12.75	11.75	8.00
No. 1 cast, Pittsburgh	12.25	12.25	11.25	9.00
No. 1 cast, Philadelphia	12.50	12.50	12.50	8.00
No. 1 cast, Ch'go (net ton)	9.50	9.50	9.50	6.25
No. 1 RR. wrot., Phila.	11.00	11.00	11.00	7.50
No. 1 RR. wrot., Ch'go (net)	9.25	9.25	8.75	4.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.50	$3.50	$3.75	$1.75
Foundry coke, prompt	4.25	4.25	4.25	2.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	7.75	8.00	7.75	4.75
Lake copper, New York	8.00	8.25	8.00	5.00
Tin (Straits), New York	51.25	51.62½	52.00	23.70
Zinc, East St. Louis	4.40	4.30	4.25	2.75
Zinc, New York	4.75	4.65	4.60	3.12
Lead, St. Louis	3.90	3.90	3.90	2.87½
Lead, New York	4.00	4.00	4.00	3.00
Antimony (Asiatic), N. Y.	7.15	7.15	7.25	5.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Feb. 6, 1934	2.028c. a Lb.	$16.90 a Gross Ton	$11.92 a Gross Ton
One week ago	2.028c.	16.90	11.92
One month ago	2.028c.	16.90	11.58
One year ago	1.923c.	13.56	6.83
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1933	2.036c., Oct. 3	1.867c., Apr. 18	$16.90, Dec. 5	$13.56, Jan. 3	$12.25, Aug. 8	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Operations Off As Valley Rate Rises

Mills Pin Hopes on Prospective Railroad Tonnage and Public Works—Price Outlook Remains Uncertain

PITTSBURGH, Feb. 6.—Sharply increased demand for sheets and strip steel has failed to influence the immediate Pittsburgh district market, and raw steel production has eased off slightly, despite a marked tendency in the other direction in the Valleys and northern Ohio. However, the placing of 12,775 freight cars by the Erie, the Nickel Plate and the Chesapeake & Ohio railroads has buoyed market sentiment and promises heavy plate tonnages to local mills before the end of the month. The Pennsylvania has also taken bids on about 40,000 tons of steel for freight car construction at its own shops. Work is already getting under way in the carrier's Pittsburgh district yard.

Structural steel awards are also expanding slightly, and new inquiry is heavier. However, it is apparent that only the release of railroad orders, and the placing of heavy public works tonnage can boost mill operations in the district to a rate comparable with other production centers.

Increasing orders for sheets and strip steel are traceable largely to the automotive industry, which had kept its requirements at a low level during the greater part of January. Nevertheless, tonnage which has reached mills thus far is considered only a forerunner of what is to come during March, and the probability that the industry's sheet and strip capacity will be severely taxed next month is growing.

Steel ingot production in the immediate Pittsburgh district has declined to 20 per cent of capacity. The two leading interests are running at even lower rates, although one or two of the smaller independent producers are running more than half their open-hearth furnaces. Steel production in the Valleys and nearby northern Ohio plants has been advanced to 42 per cent, with an upward tendency still apparent. In the Wheeling district last week's 60 per cent rate continues to hold.

Market interest continues to center in second quarter prices on sheets and strip steel, which must be filed by Feb. 19, if they are to be wholly effective for the period. While advances of $3 to $5 a ton have been generally anticipated, strenuous opposition on the part of the automotive industry has recently clouded the situation. Producers can easily prove that current quotations are below the cost of production of many finishes of sheets, but some makers believe that a further advance at this time would interrupt the buying movement which now seems to be under way. Makers of hot-rolled strip in the Chicago district have filed a price of 1.80c., Chicago, reducing the differential over Pittsburgh to only $1 a ton. Strip is thus established in that district at the same differential over Pittsburgh as has existed for the past few months in the case of bars, plates and shapes.

Pig Iron

Movement of foundry iron in this district is at about the same rate as in January, although slightly heavier shipments are reported at one or two points. The basic market remains very quiet, with large buyers showing no interest. Prices appear to be well stabilized.

Semi-Finished Steel

Demand for sheet bars is improving as finishing mill operations are stepped up in the Valleys and other producing centers. However, tin plate mills in the immediate Pittsburgh territory are still running at a low rate, and demand for tin bars shows no change. Forging billets are more active, and makers of wire rods report a heavier movement to the bolt, nut and rivet industry.

Plates and Shapes

Railroad buying is the outstanding feature of the plate market this week, with 12,775 freight cars formally awarded by the Chesapeake & Ohio, the Nickel Plate and the Erie. Twelve builders shared in this order, and will require up to 175,000 tons of steel for the work. The Pennsylvania took bids yesterday in Philadelphia on about 40,000 tons of steel for its car building program, and will probably require a similar additional tonnage for the work. No awards have yet been announced on this business. Following an amendment to Resolution 29 of the iron and steel code, mills quoted on this business under that resolution. As bids were asked under both Resolution 29 and the regular commercial delivered price, there may be some delay in awarding the contracts. The plate market is also featured by heavier inquiries from the United States Engineers at various places in the Ohio and Mississippi river valleys, with at least 5000 tons of steel to be bid on this month. The structural steel market is slightly more active, with railroad inquiry more impressive. The Illinois Central is taking bids on additional bridges, and the United States Government is in the market for 5400 tons of steel for radio towers in the Panama Canal Zone and Hawaii. Ramps for the Pittsburgh postoffice will take 1100 tons of structural shapes.

Rail and Track Accessories

Recent buying activity by the railroads has been confined almost entirely to rolling stock, and no rail and accessory inquiry has come out which might be shared by Pittsburgh district mills. Reports in Washington to the effect that heavy rail orders would be placed before March 31, when the $36.375 a ton price expires, are encouraging. However, it is not believed likely that much of this business will come to Pittsburgh, as the roads ordinarily served by this district seem to be well covered.

Bolts, Nuts and Rivets

With January tonnage having been much better than most makers had anticipated, the new month gets under way with an optimistic note. Delay in the signing of the bolt and nut code has been a disturbing factor for two or three months, and action is still delayed. However, the price structure is well maintained, and makers are now beginning to benefit from the 70 per cent discount on bolts which became effective in the last quarter. Railroad buying is contributing heavy tonnage to local producers, and movement to the automobile industry is increasing.

Bars

The bar market is still quiet. Sales are largely in small lots, and large consumers show no disposition to obtain quarterly coverage at the 1.75c Pittsburgh price. The requirements of farm implement makers are slightly heavier, but spring production programs have not got under way, and it will be March before a satisfactory movement may be expected. Reinforcing bars are not as active as had been anticipated, and shipments are temporarily affected by severe weather conditions. Large inquiries are not numerous in this territory.

Tubular Goods

The pipe market continues quiet, with boiler tubes alone showing increased activity. Quantity extras on this product have been revised, with lots of 2000 to 10,000 lb. now taking

the extra which formerly applied to all amounts up to 10,000 lb. Purchases of less than 2000 lb. take a higher extra, effective Feb. 1.

Wire Products

Merchant wire products are still very dull. No demand is coming from the farming industry, and distributers are awaiting warmer weather to move present stocks. A moderate improvement continues in demand for manufacturers' wire from the automotive industry.

Cold-Finished Steel Bars

The placing of a fair amount of automotive tonnage in the last week has benefited producers considerably. However, production remains at a low rate, and new buying from miscellaneous sources is light.

Sheets

With purchases by the automotive industry gradually expanding, sheet mill operations in this and nearby districts have been advanced to at least 50 per cent of capacity, with further improvement expected. Two or three sheet mills which had long been idle are being prepared for immediate production, and one or two producers are reported to be fully booked for the remainder of the quarter. Demand from sources other than the automotive industry shows no marked expansion, but consumers are holding their own. A considerable tonnage of sheets will be required for railroad cars to be built by the Van Sweringen group and the Pennsylvania. While talk of price advances on sheet mill products is still widely heard in this district, the purchasers have made no definite decision on the subject. Objection by large consumers to advances already in effect have been of deep concern to steel mills, and some of them hesitate to raise current levels, even though some of them are below the cost of production.

Tin Plate

Specifications seem to have expanded slightly, and the leading interest has stepped up its production rate to 54 per cent of capacity. Several independent plants are in the 40 to 50 per cent range, and the industry averages at least 40 per cent.

Coal and Coke

Foundry and furnace coke remain very dull, although movement of domestic material has been very heavy in the last week. A domestic coke shortage is reported in Canada, and local sellers have secured some tonnage which might otherwise have been competitive so far as this district is concerned. Coal prices are unchanged, but demand is very light.

Strip Steel

Mills have benefited materially from automotive orders in the last week, and most of them have stepped up production. Hot-rolled strip producers are now running at about 45 per cent, with further increases in prospect. While cold-rolled material is moving at a somewhat slower rate, a substantial gain in tonnage is reported. Price advances for the next quarter are still being discussed, but no estimate of a proposed change has been made public.

Scrap

A purchase of 15,000 to 20,000 tons of heavy melting steel by a large consumer in this district at $13.50 has established the market at a firm level, and dissipated all weakness which was apparent last week. Distress tonnage has been taken out of the market, and purchase of a small lot of steel at the same price by another consumer has further strengthened the situation. With steel ingot operations rising rapidly in other districts while Pittsburgh is barely holding its own, the market here is held back to some extent. However, sale of the Pennsylvania Railroad list of 21,500 tons of Feb. 7 is expected to bring out considerably higher prices. The other grades of scrap are generally unchanged. Hydraulic compressed sheets were erroneously quoted last week at $13.25 to $13.75, the actual market having been $13 to $13.50.

Additional Stack Fired in South

BIRMINGHAM, Feb. 6. — Current buying of pig iron is light and consists mostly of small spot orders. Most foundries are amply stocked for the present. February may bring an improvement in both buying and shipping, as stocks are gradually being worked down. Mention is being made of a possible advance in price, but nothing definite has been done in that direction to date. The present price of $13.50 has been in effect since August.

Republic Steel is back on a two-furnace basis, having blown in its No. 2 stack last week. This furnace was shut down Dec. 31 for repairs.

This additional stack increases the district's total to 10, with three on basic, five on foundry, one on recarburizing and one on ferromanaganese.

Cast pipe tonnage has been slack during the past two weeks and prospects for the next several weeks are not encouraging.

Steel

Although not particularly active, the market for wire products and sheets has been fair and the volume of new business higher than expected. The country trade has been holding up better than is usually the case at this time of year. Demand for structural steel, bars, and plates is sluggish, with new tonnage irregular and small.

The railroad outlook is much better and there is prospect of substantial buying. It is expected that around 35,000 tons of rails and track material will be placed in the near future, with other tonnage to follow. Very little of the 1934 requirements of the larger railroads in the South has been placed. Railroad business will likely be the main support of the local steel market during the next several months.

Open-hearth operations are unchanged, with 12 units in operation. This number has been maintained steadily since the middle of December.

Boston Pig Iron and Scrap Sales Decline

BOSTON, Feb. 6.—Business in pig iron has flattened out, sales aggregating but a few hundred tons, with foreign brands outdoing domestic. Furnace representatives report little current business in sight, but expect better buying before the end of the quarter as casting orders are increasing, although slowly. Southern foundries have been making some attractive prices on prospective castings business in this territory, making it difficult for New England foundries to meet the competition. Southern prices on stove castings are especially attractive.

A further tapering off in the movement of scrap is noted, with some modification in prices for No. 1 heavy melting steel, T-rails, bundled skeleton and shafting. The market for No. 1 heavy steel for Pittsburgh delivery now appears to be around $7 a ton on cars shipping point, and for Worcester, Mass., delivery $7 to $7.50. Pittsburgh is offering $11 to $11.50 a ton, delivered, for No. 2 steel, which figures back to $5.30 to $5.50 on cars here, but exporters are paying $5.50 to $6 delivered locally; consequently little material is moving southward. Demand for cleaned motor blocks is, perhaps, more active at $8 to $8.50 a ton delivered New England points. Brokers report the textile machinery market as $10 to $10.50 a ton delivered New England, but admit the best bids made recently were $9.50 to $10. Owners of scrap generally are holding for higher prices, which restricts movement.

Bethlehem and Midvale Low on Armor Plate Bids

THE ORDNANCE BUREAU, Navy Department, took bids Feb. 5 on 1702 tons of class B armor plate for an airplane carrier now building. The Bethlehem Steel Co. was low bidder at $485 a ton on 1340 tons, making up one classification. Midvale Co. was low bidder on the remaining groups. On 324 tons the Midvale quotation was $420 per ton and on 38 tons it was $605 a ton.

Chicago Ingot Rate Rises Five and One-Half Points

Sharp Gain in Business from Automobile Industry — Chicago Differential on Hot Strip Reduced to $1 a Ton

CHICAGO, Feb. 6. — Automobile business and impending railroad car tonnage have added greatly to the stability of this market. Automobile manufacturers have been buying heavily and have materially increased their specifications. There is also an appreciable gain in the use of steel by farm implement manufacturers. The railroad car tonnage, which should reach mills in 30 to 60 days, will give help where it is most needed, i. e., to plate mills.

Price structures all remain strong unless the tendency to eliminate Pittsburgh-Chicago differentials by lowering prices at Chicago can be construed otherwise. An example of adjustment in differentials is afforded by hot-rolled strip, which is a $1 a ton lower at Chicago, while the Pittsburgh price remains unchanged.

New sales of finished steel have failed to make a marked gain over a week ago, but the volume of releases received since late in January has forced up output to 36 per cent of ingot capacity, a gain of five and one-half points.

Pig Iron

Shipments of Northern iron are definitely on the upgrade, the greatest support coming from automobile manufacturing centers and parts makers. It should also be noted that the melt of farm machinery builders is turning up sharply, and their schedules call for additional gains. Railroad car business promises further aid to the foundry industry. Prices are unchanged, though foundrymen generally believe that advances can be expected in the not distant future.

Cast Iron Pipe

Charges of graft and resulting shake-ups of various CWA organizations have slowed up the local market. The CWA was accounting for a large number of small tonnages and a few large ones, and pipe still to be ordered looked exceedingly attractive in the present market. The Sanitary District, Chicago, is inquiring for a few small lots of special castings, and Springfield, Ill., opened bids Feb. 5 on a readvertised project. Glamorgan Pipe & Foundry Co. is low bidder on 3000 ft. of 16-in. pipe at Shorewood, Mich. Decision on 900 tons for Wilmette, Ill., is expected this week.

Reinforcing Bars

This market remains dull and shops are feeling the pinch of falling operations. Awards are entirely confined to small lots, which are not very numerous. Inquiries are bolstered by the activity of the Sanitary District, Chicago, which has obtained Federal funds for sewers and sewage disposal plants. This work will require 8000 tons in the near future. Bids will be taken at 10-day intervals on lots ranging from 600 to 700 tons each. The State of Illinois is due to open bids Feb. 8 on 500 tons of road work, and inquiry is out for a 126-ton highway bridge at Joliet, Ill.

Hot-Rolled Strip

Effective Feb. 13 prices for hot-rolled strip will be reduced $1 a ton to 1.80c. a lb., Chicago. The spread between Pittsburgh and Chicago will then be only $1 a ton. Cooperage stock will likewise be dropped $1 a ton. This commodity carries a 10c. extra above base, so that the Chicago price will be 1.90c. a lb. Specifications remain sluggish and gains in production have been small.

Rails and Track Supplies

The Southern Pacific has divided an order for 40,000 tons of rails among the United States Steel Corpn., Bethlehem Steel Co. and the Colorado Fuel & Iron Co. The Chicago & North Western has revised its earlier ideas of its tonnage requirements, and if it buys at this time will take only 25,000 tons instead of 65,000 tons, as originally contemplated. There are no indications in this market pointing to the placing of orders for additional large tonnages. There has been a substantial increase in miscellaneous orders for track supplies and these tonnages are moving promptly from mills. The light rail market is very quiet.

Wire Products

Little change is taking place in this market beyond the increased demand from automobile plants. Quantities of wire rope used for building purposes are small and oil well drilling accounts only for such tonnages as needed for replacement. Spring weather is being awaited for a real showing in orders from rural districts. In the meantime jobbers continue to hold large stocks, but their position is strengthened by easier collections. At this time there is little promise from utilities that they will enter the market for more than replacement needs of insulated copper wire. Wire mill operations remain at 35 per cent of capacity.

Bars

This commodity is now receiving substantial support from builders of automobiles, specifications having gained materially in the last few days. This trend should continue, in the opinion of steel producers. Releases for farm machinery are again being stepped up, and road machinery manufacturers not only are maintaining fair schedules but are particularly optimistic as to the near future.

Sheets

Demand from automobile centers is the main support of this market. Miscellaneous users have for the most part fair stocks on hand, and demand for their products remains light. The roofing trade exhibits unusual caution, considering that open weather is only a few weeks away. Hot mills are producing at 50 to 55 per cent of capacity.

Structural Material

Fabricators estimate that about 19,000 tons are definitely on the active list and that business likely to break in the near future will bring at least 46,000 tons to local shops. Awards are low at about 6000 tons, and new inquiries do not total above 7000 tons. On the bearish side of the picture is the report from estimating departments that they are no busier than in March last year.

Plates

Orders for the Van Sweringen cars have been placed, the total number being 12,885, including 159 passenger cars. Orders were widely distributed, both geographically and as to the number of shops that participated in the business. The Chicago district will get its full share and, as a consequence, plate mills will soon get tonnage that is badly needed. Another dam on the Mississippi River has been placed, and 500 tons of plates for tanks has been ordered for erection near Kansas City, Kans.

Scrap

Dealers are somewhat confused concerning the market as it now stands, though they are steadfast in their belief that prices will again move upward as soon as steel production reaches a higher level. Mills remain very strict in the matter of acceptances and cars have been ordered away where quotas have been overshipped. This situation has given rise to weakness in prices paid by dealers, but prices paid by consumers remain unshaken. The market, rather than being weak, simply lacks the snap it displayed several weeks ago.

Tone of New York Market Shows Improvement

Railroad and Automobile Buying, as Well as Strike Fears, Stimulate Covering—Russian Inquiries Begin to Appear

NEW YORK, Feb. 6.—The large award of cars and locomotives by the Van Sweringen lines and the sharp rise in the activity of the automobile industry have quickened the tempo of the local steel market. The equipment orders will benefit mills rolling heavier products, besides taking sizable quantities of sheets and stainless steel. The effect of increased purchases of steel by automobile companies has been indirect so far as this district is concerned, but nevertheless telling. With some sheet and strip mills booked solid for the remainder of the quarter on automobile orders and with others fast filling up, buyers generally are taking renewed interest in the market. Another factor which is influencing consumers to cover their requirements is the danger of labor trouble in the steel industry. In fact, buyers have shown greater alarm over the President's order covering employee elections than steel producers themselves. Several sizable purchases of various steel products are traceable to this consideration alone.

Export demand continues to show greater promise, with the appearance of actual inquiries for sizable quantities of steel from Soviet Russia. Tin plate continues to be an active export item and, in addition, is showing a surprising comeback in the domestic market. In view of heavy specifications in the fourth quarter it had been thought that new business in tin plate would be negligible until some time in the second quarter of this year.

Bids on 1000 tons of reinforcing bars, 4500 tons of structural steel and 350 tons of curb plates for the Midtown Hudson River tunnel have been postponed until Feb. 14. General contract bids on the Midtown post office, New York, requiring 10,000 tons of structural steel, have again been rejected and tenders will be asked for the fourth time. CWA work is accounting for a considerable number of the smaller finished steel and cast iron pipe tonnages being currently placed.

The Boston & Albany is in the market for tie plates.

Pig Iron

Current inquiry is in better volume than for any period during the past two months, and sellers were able to dispose of 2500 tons of prompt and first quarter iron during the seven-day period ended today. Sales in the previous week totaled 3200 tons, and 1400 tons was booked a fortnight ago. Practically all melters in this district have advanced operations since the turn of the year, but most of them still have sufficient yard stocks to cover estimated requirements for at least one more month.

Reinforcing Steel

This district has been extremely quiet since the first of the year, but sizable awards for various public structures are expected to be announced during the next fortnight. Local distributers will supply 425 tons of bars for a seawall on Ellis Island and 100 tons for an ammunition depot at Lake Denmark, N. J. New York State will soon announce general contracts for highway work involving about 500 tons of mesh and 800 tons of bars, and New Jersey opened bids today for work requiring about 500 tons of reinforcing. Low bidders for bridge approaches and tunnels at New York have not yet qualified, and 400 tons required for the hospital at Brentwood, L. I., has been readvertised for Feb. 7. Bids were opened today at West Point, N. Y., for 500 tons of bars for a new Academy building.

Scrap

A slackening of export and domestic demands is unfavorably influencing sentiment in this district, but the weakness is not sufficiently pronounced to occasion price adjustments on important grades. Brokers continue to purchase No. 1 and No. 2 steels at $9 and $7.50, barge, respectively and stove plate is 50c. higher at $5.75 a ton, as a result of recent accumulations for export and nearby consumer accounts. The price bases for rolling mill and blast furnace grades are somewhat nominal in the absence of adequate tests. Bethlehem continues to purchase small tonnages of heavy melting steel and cast grades, but other eastern Pennsylvania mills are temporarily out of the market. Japan is again inquiring for supplies, England is taking some tonnage, and new Italian and Polish commitments are in satisfactory volume.

Coast Construction Work Increasing

SAN FRANCISCO, Feb. 5.—Construction of the Broadway low level tunnel, estimated to cost $3,752,000, is assured in a call for bids at Oakland, Cal. The 1400-ft. highway tunnel will be of twin bore and will require approximately 2210 tons of reinforcing bars and 222 tons of structural steel.

Increased activity during the week is indicated by calls for bids on a greater number of projects than for any like period during the first quarter. Specifications for radio towers at the Navy Base at Pearl Harbor, T. H., call for 1750 to 2250 tons of structural steel, and a like tonnage will be needed for Navy radio towers at Summit, C. Z. Bids have been taken for a Federal bridge over the Missouri River near Fort Peck, Mont. An award of 1400 tons of structural steel should be made shortly for this project. New inquiries, calling for a total of 7416 tons of structural steel and 3107 tons of reinforcing bars, were reported during the week.

The outstanding letting of the week was to Moore Dry Dock Co., which took 1494 tons of structural for the Park Street bridge in Oakland, Cal. Soule Steel Co. booked 440 tons of reinforcing bars for an approach pier on the San Francisco-Oakland bridge. At Seattle, 900 tons of bars were divided between Pacific Coast Steel Corpn. and Northwest Steel Rolling Mills Co. The Consolidated Steel Corpn. was awarded 350 tons of reinforcing on two projects in southern California, while Gunn-Carle Co. took 400 tons for work in the central part of the State. Awards during the week totaled 2541 tons of structural steel and 2183 tons of reinforcing bars.

United States Pipe & Foundry Co. booked 365 tons of cast iron pipe at Glendale and Daly City, Cal.

Mill and warehouse steel prices have remained unchanged, although cast iron pipe prices were recently raised $2 a ton, with further increases expected. Pending municipal water projects should stimulate the cast iron pipe market before the end of the quarter.

Railroad Letting Is Feature at Philadelphia

Pennsylvania Railroad Takes Bids on Large Tonnage of Steel—Ingot Rate Rises One Point to 24 Per Cent

PHILADELPHIA, Feb. 6.—The Pennsylvania Railroad is expected to distribute steel awards this week for either part or all of its requirements for 6500 freight cars. The total tonnage has not been announced. Bids were opened here yesterday for 22,350 tons of plates, shapes, bars, sheets and center sills, together with 18,000 wheels, 3000 axles, and 166,000 ft. of copper-bearing steel pipe. All bids, submitted under the Clayton act, were presented under code prices in accordance with Resolution 29, except that one company put in prices on several products that were somewhat higher than those of competitors.

The bids were made under Resolution 29 after the institute code committee ruled that this was the proper form rather than under Commercial Resolution 34. The former covers bids for railroad requirements with an allowance of five mills per mile for freight. The Pennsylvania has asked for bids under both Resolution 29 and Resolution 34. It is expected the tonnage will be widely distributed among producers, who were present in large number at the opening of bids.

The market has shown but little change the past week, though open-hearth operations have been increased one point to 24 per cent of capacity.

There is an improved sentiment in the trade in anticipation of tonnages from Government-financed projects reaching mills soon in increasing volume.

Mills booking automobile sheets are heavily engaged, one nearby producer being filled to capacity on cold-finished sizes for the remainder of the present quarter. A nearby plant today started its small structural mill, to be operated the remainder of the week.

Pig Iron

Inquiry is light, but melt has increased slightly and is reducing stocks of iron. An early, though not large, buying movement is believed by blast furnace operators to be in prospect.

Plates, Shapes and Bars

While some mills report a tapering off in demand, others have noted a gain and look for sharp increases soon from miscellaneous sources, and particularly from Government-financed projects. The tonnage for the 6500 freight cars is not definitely known but will be much greater than that on which bids were taken yesterday. These bids involved the following requirements: Plates, 6200 tons; steel bars, 1400 tons; shapes, 7000 tons; center sills, 4150 tons; No. 10 gage hot-rolled sheets, 3600 tons; wheels, 18,000; axles, 3000; copper-bearing steel pipe, 166,000 ft. The Pennsylvania is said to have allocated requirements for bolts, nuts and rivets on which bids were taken last week. Fabricators are figuring on more business, among which are 5000 tons for a bridge at Cambridge, Md., for the Maryland Highway Commission and an equal tonnage for radio towers for the Navy Department.

Sheets

Mills making automotive sheets have become comfortably booked. One nearby maker is filled to capacity for the remainder of the present quarter on cold-finished sizes. Deliveries on these sizes generally range from five to six weeks. On the wider sizes, 54 in. and over, mills are especially heavily booked and have little if any capacity for further orders. Deliveries on hot-rolled sizes range from three to four weeks. There is a moderate amount of buying by stovemakers, and schedules of radio manufacturers are said to be rather large and early releases are looked for.

Warehouse Business

Jobbers report a drop of only 5 to 10 per cent in orders under the December level, which was well above the average of last year. There is a gain in orders and it has been observed that those reaching warehouses on Monday have shown a bulge over previous requirements received on that day.

Imports

The following iron and steel imports were received here last week: 1618 tons of pig iron and 11 tons of manganese ore from British India; 198 tons of chrome ore from Russia; and 35 tons of steel bars, 30 tons of steel bands and 15 tons of structural shapes from Belgium.

Scrap

The market is quiet but firm. Cast grades are particularly strong. There is still buying for export but in this as well as the domestic market, dealers show a growing tendency to hold material, feeling that an upswing in the market will develop soon in view of the improved outlook for the steel trades. However, consumers still are disinclined generally to come into the market, except for immediate requirements, but are awaiting bookings for new business. One mill continues to hold up shipments on a contract for heavy melting steel.

Sheet Demand Heavy At Cincinnati

CINCINNATI, Feb. 6. — Continued heavy orders from automotive users and a noticeable upward trend of general sheet demand have sustained new bookings of district sheet mills at close to 90 per cent of capacity. Operations are well above 50 per cent of capacity, rolling schedules not having expanded as rapidly as demand. The Middletown unit of the leading district interest, however, is the exception to the rule, operations there having reached full capacity. Persistent reports of impending price increases have brought a number of sheet users into the market to cover their requirements for the remainder of the quarter.

Pig Iron

Inquiry is confined to a few scattered requests for quotations on small amounts of iron. New business is limited to car lots for immediate use, the only substantial recent order being 100 tons of silvery for shipment into west central Ohio. Melt is a little heavier and in one or two instances foundries are now operating steadily. Some melters, who have been out of the market for several months, have returned for small quantities of material.

Coke

Foundry coke shipments are heavier, and colder weather is stimulating a better demand for domestic grades. The price of by-product foundry coke is steady at $9.53, delivered in Cincinnati, and no change is expected this month.

Scrap

Speculative activity in other districts has had no effect on this area, dealers adhering to conservative trading for immediate application on old contracts. Mills refuse to purchase except in small quantities. Bid schedules remain intact.

Van Sweringen Awards Are Feature at Cleveland

Equipment Bought Will Require 175,000 Tons of Steel—Automotive Demand Unabated—Ingot Output Up Four Points

CLEVELAND, Feb. 6.—The awards of equipment by the Erie, Chesapeake & Ohio and Nickel Plate railroads late last week and continued heavy buying by the automotive industry are the outstanding features of the finished iron and steel market. The three Van Sweringen railroads placed 12,725 freight cars and 159 passenger, mail and express cars and the Nickel Plate road bought 20 locomotives and 20 extra tenders. The freight car business was divided between 12 car builders. The three roads are placing the trucks, brakes and other specialties this week and will allocate these to the car builders. Some of the large plate tonnage is expected to be placed with mills before the end of the week. Total steel requirements for the cars are estimated at 160,000 to 175,000 tons.

Ingot output in the Cleveland-Lorain territory increased four points to 58 per cent of capacity this week as a result of the addition of two open-hearth furnaces by the Corrigan, McKinney Steel Co., which also started its fourth blast furnace.

The heavy volume of buying which recently was started by the automotive industry shows no signs of abatement. Some of the automobile plants are ordering all the steel they expect to take in before April 1, and some of the mills are getting comfortably filled up with cold-finished sheet tonnage for the quarter. Stamping plants in this territory are receiving many new inquiries for automobile parts.

There is still talk of price advances on sheets and strip steel for the coming quarter, but evidently no definite decision has been reached regarding a change.

Bars, Plates and Shapes

Miscellaneous orders for these products improved in number and size the past week. Two structural awards were placed aggregating 290 tons. New projects include a local university stadium calling for 1000 tons, to be built if Federal aid is secured. Several hundred tons will be required for local grade crossing elimination projects, inquiry for one of which is out. Considerable inquiry is coming out for reinforcing bars in small lots for State highways. Ohio car shops secured 1250 freight cars in the Van Sweringen railroad awards.

Pig Iron

Activity of the automotive industry is stimulating the demand for pig iron, both sales and shipments having increased. A leading producer sold 5000 tons during the week in lots up to 1000 tons, as compared with 3000 tons during the previous week. Some foundries outside the automotive field have increased operations and are taking iron somewhat more freely than recently.

Sheets

The automotive industry continues to place round-lot orders, some buyers covering for their requirements for the remainder of the quarter. The Fisher Body Corpn. during the week purchased considerable tonnage for its Michigan plants, following the round tonnage purchased for its Cleveland plant reported last week. Some of the mills have sold their entire first quarter output of cold-rolled sheets. Several of the mills have increased finishing mill operations and the Empire Sheet & Tin Plate Co., Mansfield, this week put on an additional open-hearth furnace. Demand from refrigerator manufacturers has improved. The stove industry is still quiet.

Strip Steel

New demand for both hot and cold strip from the automotive industry is fairly heavy and some of the mills have accumulated considerable tonnage. Good releases came during the week from some of the automobile parts manufacturers for production material and new purchases are expected from these plants shortly. Large stocks accumulated last year by some of the parts makers apparently are becoming well used up.

Scrap

Local consumers and mills in the Valley district are taking liberal shipments against recent purchases, and at the rate scrap is moving some new buying is expected within the next two weeks. No sales to consumers are reported during the past week. Cleveland scrap is being absorbed by local mills. Prices are firm. February scrap lists of automobile companies which closed during the week brought good prices.

Further Rise in Output At Buffalo

BUFFALO, Feb. 6.—The Lackawanna plant of the Bethlehem Steel Corpn. has started an additional open-hearth, making eight in active operation; Republic Steel Corpn. is now operating five, an addition of one unit. Wickwire-Spencer Corpn. continues to operate one open-hearth. The west plant of the Seneca sheet division of Bethlehem was warming up early this week, and will soon raise Seneca's operations to 80 per cent as against a rate of 40 per cent thus far this winter. Accumulation of metal furniture and automobile sheet orders are said to be responsible for the heavy increase in production.

A pickup is noticeable in fabricated structural and reinforcing bar awards. A prison addition at Comstock, N. Y., requiring 340 tons, is said to have gone to a New York fabricator. A Buffalo fabricator was low on five Erie County bridges involving 350 tons, out of nine calling for a total of 750 tons. Reinforcing bar bids will be taken Feb. 27 for a 100-ton school in South Buffalo, and Feb. 21 for 800 to 1000 tons of reinforcing bars for new mills for the Eastern States Milling Co., Buffalo.

Pig iron bookings are principally in carload lots, bolstered here and there by a more sizable order. Shipments are proceeding steadily, indicating that the melt is being maintained at scheduled rates. Large inquiries are lacking. Blast furnace operations apparently are unchanged.

Sales of machine shop turnings are being made at Niagara Falls for $8 to $8.50, making the Buffalo price about $6.75 to $7.25, though there is no market for this material in the city at the present time. A little demand exists for railroad malleable. A few sales of short shoveling steel turnings at frontier points have been made at $9, consuming point. One of the largest consumers is endeavoring to buy No. 1 heavy melting steel for $11, its last buying price, but this price is no longer attractive to dealers, who will not sell at less than $11.50 to $12. Practically all sales now in the making will bring higher than quoted prices. A sizable consumer is understood to be willing to pay $11.50 for a tonnage of No. 1 cast, but has so far been unable to buy. Two lots of selected No. 1 cast were sold for $13, and there seems to be a decided shortage. Dealers are offering $11 for No. 1 cupola cast, and a sale of rails 3 ft. and under is reported at $13. A central New York consumer of stove plate is reported to have bought at a price which figures back to about $10.25, Buffalo.

January Ingot Production Makes Gain of 9 Per Cent Over December

MONTHLY production of steel ingots as reported by American Iron and Steel Institute for January, 1934, totaled 1,996,897 tons, representing a gain of close to 9 per cent over the preceding month of December, 1933. Part of this gain was due to the fact that January had 27 working days and December contained 25. The daily production rate in January, however, was slightly above that of December.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported for 1933 by Companies Which Made 98.10 Per Cent of 1932 Ingot Output

			Calculated Output All Companies		No. of Working Days	Per Cent Operation
1933	Open-Hearth	Bessemer	Monthly	Daily		
January	885,743	109,000	1,030,075	39,618	26	18.23
February	922,806	126,781	1,086,867	45,286	24	20.83
March	784,168	94,509	909,886	33,699	27	15.50
April	1,180,893	135,217	1,362,856	54,514	25	25.08
May	1,716,482	216,841	2,001,991	74,148	27	34.11
June	2,211,657	296,765	2,597,517	99,904	26	45.96
July	2,738,083	355,836	3,203,810	128,152	25	58.95
August	2,430,750	370,370	2,900,611	107,430	27	49.42
September	1,991,225	242,016	2,312,562	88,944	26	40.92
October	1,847,756	191,673	2,111,866	81,226	26	37.37
November	1,331,091	156,939	1,540,882	59,265	26	27.26
December	1,624,447	132,787	1,819,648	72,786	25	33.48
Twelve months	19,665,101	2,428,734	22,878,571	73,801	310	33.95
1934						
January	1,786,467	172,489	1,996,897	73,959	27	34.13

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.

Railroad Equipment

Dow Chemical Co. has awarded two aluminum tank cars to General American Transportation Corpn.

Erie has awarded 3725 freight cars and 125 passenger cars as follows: American Car & Foundry Co., 500 50-ton automobile cars, 500 50-ton box cars and 50 semi-suburban coaches; Standard Steel Car Co., 750 50-ton hopper cars; Pressed Steel Car Co., 750 50-ton hopper cars and 25 suburban cars; Greenville Steel Car Co., 750 50-ton hopper cars; Pullman Car & Mfg. Co., 50 suburban cars; Ryan Car Co., 250 50-ton hopper cars and 125 70-ton flat cars; Magor Corpn., New York, 100 40-ton furniture cars.

Chesapeake & Ohio has awarded 7800 freight cars as follows: American Car & Foundry Co., 1000 50-ton gondola cars and 850 50-ton hopper cars to be built at Huntington, W. Va., and 50 50-ton automobile cars to be built at Berwick, Pa.; Pullman Car & Mfg. Co., Michigan City, Ind., 650 50-ton box cars; Standard Steel Car Corpn., Butler, Pa., 1150 50-ton hopper cars; Pressed Steel Car Co., McKees Rocks, Pa., 500 50-ton hopper cars; General American Car Co., East Chicago, Ind., 2250 50-ton hopper cars; Ralston Steel Car Co., Columbus, Ohio, 750 50-ton hopper cars; Canton Car Co., Canton, Ohio, 500 50-ton hopper cars; Mount Vernon Car Mfg. Co., Mount Vernon, Ill., 100 50-ton furniture cars. This road has also placed 15 coaches and 11 mail and express cars, these going to the St. Louis Car Co., St. Louis, Mo.

New York, Chicago & St. Louis has placed 1200 freight cars as follows: 500 50-ton box cars with Pullman Car & Mfg. Co., 675 50-ton low-side gondola cars with Bethlehem Steel Co., Johnstown, Pa., and 25 50-ton flat cars with Ryan Car Co., Negewisch, Ill.

New York, Chicago & St. Louis has also placed seven coaches with Pullman Car & Mfg. Co. and one mail and express car with the St. Louis Car Co.

New York, Chicago & St. Louis has placed 15 locomotives and tenders with American Locomotive Co., Schenectady, N. Y.; five locomotives and tenders and 20 extra tenders with the Lima Locomotive Works, Lima, Ohio.

Detroit Railways, Detroit, is inquiring for 1500 tons of steel ties.

Milwaukee Road is considering the purchase of 30 locomotives.

St. Louis-San Francisco Railway has petitioned United States District Court at St. Louis for permission to expend $1,671,719 for the following equipment: 100 miles of 112-lb. rails, tie plates and other accessories, $598,335; two caterpillar tractors, $7,075; two paint spraying machines, $3,000; power-operated leads for pile driver, $2,500; rotating engine for one Brown hoist, $2,000; cast-steel hoppers and panel sides for seven hopper cars, $1,240; Creco four-point brake beam supports for 352 flat-bottom coal cars, 58 hopper cars and five tank cars, $7,553; Evans type automatic loading devices for 100 cars, $41,000; Youngstown corrugated doors and improved Murphy door fixtures for 1000 box cars, $51,402, air conditioning various units of passenger equipment, $35,000; converting two dining cars into combination dining-lounge cars, $30,000; 200-ton coal shute at Thayer, Mo., $15,490; additional mechanical equipment at Springfield, and Chaffee, Mo., and Fort Scott, Kan.; Vulcan steam hammer for pile driver, $37,879; building 2600 hp. oil electric cars in shops, $150,000; Thermic syphons for six locomotives, $13,324; Gunderson anti-fluepitting devices for 20 engines, $7,258; shop machinery and tools for various points, $30,873.

Southern Pacific has divided orders for 40,000 tons of rails among the United States Steel Corpn., Bethlehem Steel Corpn., and Colorado Fuel & Iron Co.

Pipe Lines

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 16 for 12,860 ft. of steel or wrough iron pipe (Schedule 2938).

American Michigan Pipe Line Co., a subsidiary of American Light & Traction Co., 120 Broadway, New York, plans welded steel pipe line from natural gas properties in Austin Township, Mecosta County, Mich., to Muskegon, Mich., about 55 miles, where service will be furnished Muskegon Gas Co., another subsidiary of parent company. Cost about $500,000.

Moran Gas Co., Asperson Building, Houston, Tex., plans welded steel pipe line for natural gas supply at Humble, Tex., and vicinity.

Aledo, Ill., plans steel pipe line for municipal gas distributing system. Artificial gas plant will be built. Financing is being arranged through Federal aid. J. A. McBride Engineering Co., 2815 Locust Street, St. Louis, is engineer.

Lompoc, Cal., plans 4½-in. steel pipe line for main water service for new system. Federal financing has been arranged. E. A. Vaughn, manager, Lompoc City Light and Water Department, is in charge.

Metropolitan Water District, Los Angeles, has awarded 290 tons of sheets for a pipe line to Southern Pipe & Casing Co.

American Factors, Ltd., Honolulu, has let general contract for a 200-ton steel pipe line.

Prospective Rail Business Is Feature at St. Louis

ST. LOUIS, Feb. 6.—Trustees of the St. Louis-San Francisco Railway have asked the Federal court for permission to expend $1,671,719 for additions and betterments during 1934, including 100 miles of 112-lb. rails, tie plates and other accessories amounting to $598,335.

Fabricators of structural steel are buying some material for stock purposes. Sheet trade is quiet, there being very little demand from the stove industry, which is holding up operations pending the making of prices for the forthcoming season.

The scrap market is firm with prices unchanged. Offerings are light, most factors holding out for higher prices. The Scullin Steel Co., which will resume operations soon, is expected to come into the market within the next two or three weeks.

Labor Board to Canvass Weirton Steel Employees

THE NATIONAL LABOR BOARD has begun action under President Roosevelt's executive order for collective bargaining by starting on the Weirton Steel Co. case. To this end, Senator Robert F. Wagner, chairman of the board, has announced that the board has sent its General Counsel, Milton Handler, and James F. Dewey of the Department of Labor to Pittsburgh and Weirton, W. Va. This was done after Senator Wagner telegraphed for an appointment for them with representatives of the company and workers "in order to acquaint them with the first steps in the board's method of procedure."

The board, complying with the Presidential order, is to ascertain if a substantial number of Weirton employees desire an election. Chairman Wagner said the manner of such ascertainment as well as what constitutes a substantial number of workers are left by the executive order to the discretion of the National Labor Board.

Spelter Advances to 4.40c., St. Louis; Copper Inactive as Price Firms at 8c.

Steady Consumer Demand Supports Lead Price Firmly at 4c. Despite Unfavorable Statistics—Tin Continues Inactive

NEW YORK, Feb. 6.—A decline of ¼c. late last week failed to attract fabricators into the market, and electrolytic copper is currently inactive at 8c. a lb., delivered Connecticut valley. Although there is little inquiry before the trade, custom interests are not inclined to press metal on the market, and it is doubtful whether positions beyond April can be secured under 8.25c. The long discussed copper code appears to have encountered unexpected opposition in many directions, and it is doubtful whether a satisfactory solution will soon be announced. In any case, the market will probably ignore code rumors until a definite settlement is imminent. In contrast to the stagnant trading conditions here, the market abroad is extremely active. The sustained appreciation of the dollar is encouraging professional accumulations, and American interests have succeeded in disposing of excellent tonnages during the week, both in England and on the Continent. Prices have generally fluctuated within narrow limits since the President's monetary announcement, and today's transactions ranged in cent equivalents from 8.25c. to 8.37½c. a lb., c.i.f. usual European base ports.

Tin

During the week Straits and refined grades were occasionally priced lower than for any period since Nov. 6, but consumers were apparently disinterested in new commitments. A few small requirements were satisfied by dealers, but importers were practically inactive throughout the week. The poor consumer demand is a direct reflection of the overbought position of many users and the present low operating rate of the tin plate industry. Demand on the Continent is fairly active, but English buyers are avoiding large transactions. First call postings in London today were £227 7s. 6d. for spot and £226 12s. 6d. for future standard, and £230 12s. 6d. for Straits at Singapore.

Zinc

Reflecting a $2 advance to $28 a ton for Joplin concentrates and possibilities of additional concerted action among miners, smelters are now holding spelter firmly at 4.40c. a lb., East St. Louis, and 4.75c., New York, for all delivery positions through April. Most sellers are asking five additional points for June commitments. Sales during the past seven-day period increased sharply to 5000 tons, as compared with 2600 tons sold in the preceding week, and 10,000 tons booked a fortnight ago. The current cautious selling attitude of smelters is directly attributable to the uncertainty regarding future supplies of concentrates. Because of the present large ore surplus of 19,950 tons, many mines have curtailed operations and others are contemplating a complete suspension of operations.

Lead

A production-shipment unbalance is still an unfavorable influence on the market, but a steady tone is currently prevailing as a reflection of steady consumer buying support. Quotations are firm at 4c. a lb., New York, and 3.90c., St. Louis, for positions through March. Sellers have booked 20,000 tons of February metal and about 11,000 tons for March delivery. Since monthly shipments recently have averaged about 30,000 tons, it is evident that consumers still have large open commitments.

Aluminum

Contraction of scrap supplies and better consumer demands have occasioned a steady strengthening of remelt aluminum quotations. No. 12 alloy remelt is available at 13.50c. for prompt and sizable parcels, but most sellers are asking premiums for small lots and forward commitments. New No. 12 is quoted from 18.50c. to 19.50c. a lb., delivered, and 98 to 99 per cent ingot continues officially priced at 22.90c. a lb.

Non-Ferrous Averages

The average prices of the major non-ferrous metals for January, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.*	7.92c. a lb.
Lake copper, New York	8.17c. a lb.
Straits tin, Spot, N. Y.	51.98c. a lb.
Zinc, East St. Louis	4.27c. a lb.
Zinc, New York	4.62c. a lb.
Lead, St. Louis	3.90c. a lb.
Lead, New York	4.00c. a lb.

*Refinery quotations; price ¼c. higher delivered in Connecticut.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 31	Feb. 1	Feb. 2	Feb. 3	Feb. 5	Feb. 6
Electrolytic copper, N. Y.*	7.75	7.75	7.75	7.75	7.75	7.75
Lake copper, N. Y.	8.00	8.00	8.00	8.00	8.00	8.00
Straits tin, Spot, N. Y.	51.62½	51.12½	50.50	....	50.87½	51.25
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.35	4.40
Zinc, New York	4.65	4.65	4.65	4.65	4.70	4.75
Lead, St. Louis	3.90	3.90	3.90	3.90	3.90	3.90
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb., delivered; new No. 12, 19.50c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 13.50c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 7.15c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.00c. to 54.00c.
Tin, bar	55.00c. to 56.00c.
Copper, Lake	9.75c. to 10.50c.
Copper, electrolytic	9.50c. to 10.00c.
Copper, castings	9.25c. to 10.25c.
*Copper sheets, hot-rolled	15.00c.
*High brass sheets	13.75c.
*Seamless brass tubes	16.25c.
*Seamless copper tubes	16.25c.
*Brass rods	12.25c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks	9.75c. to 10.00c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	5.75c. to 6.75c.
Lead, sheets	7.75c.
Antimony, Asiatic	8.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.00c. to 33.00c.
Babbitt metal, commercial grade	25.00c. to 60.00c.

* These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.50c.
Tin, bar	56.50c.
Copper, Lake	9.00c.
Copper, electrolytic	9.00c.
Copper, castings	8.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.00c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.50c.
Babbitt metal, high grade	60.00c.
Solder, ½ and ½	32.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.25c.
Copper, hvy. and wire	6.25c.	7.00c.
Copper, light and bottoms	5.25c.	6.25c.
Brass, heavy	3.50c.	4.25c.
Brass, light	3.00c.	3.625c.
Hvy. machine composition	4.75c.	5.625c.
No. 1 yel. brass turnings	4.25c.	5.125c.
No. 1 red brass or compos. turnings	4.25c.	5.25c.
Lead, heavy	3.00c.	3.625c.
Zinc	2.50c.	3.125c.
Cast aluminum	7.75c.	10.00c.
Sheet aluminum	12.00c.	13.50c.

Reinforcing Steel

Awards 2800 Tons—New Projects 13,375 Tons

AWARDS

Ellis Island, N. Y., 425 tons, sea wall, to Joseph T. Ryerson & Sons, Inc.

Chicago, 200 tons, Henrotin Hospital, to Concrete Steel Co.; previously reported to an unnamed bidder.

San Francisco, 100 tons, stockhouse for Milwaukee Brewery, to Gunn-Carle Co.

Oakland, Cal., 100 tons, stockhouse for Golden West Brewery, to Gunn-Carle Co.

San Francisco, 440 tons, approach pier on Trans-Bay bridge, to Soule Steel Co.

Stockton, Cal., 200 tons, 10 silos for Santa Cruz Portland Cement Co., to Gunn-Carle Co.

State of Oregon, 200 tons, highway work in 12 counties, to unnamed bidders.

Seattle, 900 tons, material for CWA project, to Pacific Coast Steel Corpn. and Northwest Steel Rolling Mills Co.

Canal Zone, 240 tons, Schedule 2935, to Laclede Steel Co.

NEW REINFORCING BAR PROJECTS

Buffalo, 100 tons, school in South Park; bids Feb. 27.

Buffalo, 800 to 1000 tons, new units for Eastern States Milling Co.; bids Feb. 21.

Philadelphia, 675 tons, Juanta apartment; Turner Construction Co., general contractor.

Hershey, Pa., 200 tons, building for Hershey Lumber Co.

Cincinnati, 400 tons for interceptor sewer.

Georgetown, Ill., tonnage being estimated, water plant.

Sanitary District, Chicago, 8000 tons, sewer and disposal plant; bids to be taken at 10 day intervals in lots of about 600 tons each.

Joliet, Ill., 125 tons, highway bridge.

Oakland, Cal., 2210 tons, Broadway low level tunnel; bids March 22.

Santa Barbara County, Cal., 245 tons, two State bridges; bids Feb. 21.

Mohave County, Ariz., 120 tons, Bureau of Public Roads project; bids Feb. 20.

Fort Peck, Mont., 100 tons, Federal bridge over Missouri River; bids under advisement.

Skaget County, Wash., 100 tons, County bridge over Swinomish Slough; bids Feb. 16.

Cast Iron Pipe

Harrisville Fire District, Burrillville, R. I., has had plans for a water system approved by Federal advisory board.

East Chelmsford, Mass., has approved a water distributing system to cost $75,000.

Tewksbury, Mass., has preliminary plans for a new water system.

Pascoag, R. I., has had plans for a water system costing about $200,000 approved by the Government.

Rhode Island is to connect all State institutions at Cranston with a water system at a cost of $53,000.

City of New York, through CWA purchasing department, awarded 200 tons of 8 and 12-in. water pipe to United States Pipe & Foundry Co., and 70 tons to Warren Foundry & Pipe Corpn.

West Kittanning, Pa., will take bids soon for pipe for water system. Fund of $58,000 is being arranged, including 200,000-gal. storage tank. Morris Knowles, Inc., Westinghouse Building, Pittsburgh, is engineer.

Charlotte, N. C., asks bids until Feb. 15 for 28,200 ft. of 6 to 16-in. for water supply system. J. B. Bridgen is city manager.

Shorewood (Milwaukee), Wis., has awarded 200 tons of 16-in. to Glamorgan Pipe & Foundry Co.

Kahoka, Mo., asks bids until Feb. 24 for 13,950 ft. of 4 to 6-in., and 200 ft. of 8-in., for water system. Frank Beard is engineer.

Tucson, Ariz., plans 64,600 ft. of 4 to 12-in. for water system. Fund of $250,000 is being arranged through Federal aid, including elevated steel tank and tower, pumping plant and other structures. Philip J. Martin, Jr., water superintendent, is in charge.

Sapulpa, Okla., plans water pipe line system. Fund of $69,000 is being arranged through Federal aid. W. F. McMurry, 32 East Twenty-fifth Street, Tulsa, Okla., is consulting engineer.

Richland Springs, Tex., plans water pipe line system. Fund of $30,000 has been secured through Federal aid, including pumping plant. J. S. Bross., San Saba, Tex., is engineer.

Elwood, Kan., plans water pipe line system. Fund of $52,000 is being arranged through Federal aid. Charles A. Haskins & Co., Finance Building, Kansas City, Mo., are consulting engineers.

Carlin, Nev., plans water pipe line system. Fund of $100,000 has been arranged through Federal aid, including pumping plant, reservoir, etc. Work is scheduled to begin in March.

Glendale, Cal., has awarded 265 tons to United States Pipe & Foundry Co.

Daly City, Cal., has awarded 100 tons to United States Pipe & Foundry Co.

Gilroy, Cal., will take bids soon on 594 tons of 16-in.

AUTOMOTIVE EQUIPMENT

AGRICULTURAL MACHINERY

SCREW MACHINE PRODUCTS

ELECTRICAL EQUIPMENT

DOMESTIC APPLIANCES

PRINTING MACHINERY

SPECIAL MACHINE PARTS

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ELEVATING CONVEYING & TRANSMISSION EQUIPMENT

WYCKOFF STEELS

to meet specific industrial requirements

Whether your requirements are standard or whether your job demands a steel of special metallurgical charactertistics involving exceptional toughness—unusually high tensile strength or extraordinary hardness, you can get it at WYCKOFF—Industry's Metallurgical Guide to Cold Drawn Steels of every description, size and shape.

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COLD DRAWN STEELS

Turned and Polished Shafting, Turned and Ground Shafting

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh mill		1.75c
F.o.b. Chicago or Gary		1.80c.
Del'd Philadelphia		2.04c.
Del'd New York		2.08c.
F.o.b. Cleveland		1.80c.
F.o.b. Buffalo		1.85c.
F.o.b. Birmingham		1.90c.
F.o.b. cars dock Pacific ports		2.30c.
F.o.b. cars dock Gulf ports		2.15c.

Rail Steel
(For merchant trade)

F.o.b. Cleveland	1.70c.
F.o.b. Chicago	1.70c.
F.o.b. Gary	1.70c.
F.o.b. Pittsburgh	1.65c.
F.o.b. Buffalo	1.75c.
F.o.b. Birmingham	1.80c.

Billet Steel Reinforcing
(Cut lengths as quoted by distributers)

F.o.b. P'gh mills	1.90c.
F.o.b. Birmingham	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. cars dock Pacific ports	2.45c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. Chicago	1.95c.

Rail Steel Reinforcing
(Cut lengths as quoted by distributers)

F.o.b. Pittsburgh	1.75c.
F.o.b. Cleveland	1.80c.
F.o.b. Chicago	1.80c.

Iron

Common iron, f.o.b. Terre Haute, Ind.	1.60c. to 1.75c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.89c.
Common iron del'd New York	1.93c.

Steel Car Axles

F.o.b. Pittsburgh	2.50c.
F.o.b. Chicago	2.50c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Birmingham	1.85c.
Del'd Cleveland	1.885c.
Del'd Philadelphia	1.885c.
F.o.b. Coatesville	1.80c.
F.o.b. Sparrows Point	1.80c.
Del'd New York	1.98c.
F.o.b. dock cars Pacific ports	2.25c
F.o.b. cars dock, Gulf ports	2.10c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.20c.
F.o.b. Chicago	3.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.
F.o.b. Buffalo	1.80c.
F.o.b. Bethlehem	1.80c.
Del'd Cleveland	1.885c.
Del'd Philadelphia	1.905c.
Del'd New York	1.9525c.
F.o.b. cars dock, Gulf ports	2.10c.
F.o.b. dock cars Pacific ports (standard)	2.25c.
F.o.b. dock cars Pacific ports (wide flange)	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.00c.
F.o.b. Chicago mill	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base..2.45c. a lb. except at Bethlehem where the price is 2.55c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Cold Finished Bars*

	Base per Lb.
Bars, f.o.b Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.15c.
Bars, Cleveland	2.15c.
Bars, Buffalo	2.20c.
Bars, Detroit	2.30c.
Bars, eastern Michigan	2.35c.
Shafting, ground, f.o.b. mill, 1½ in.	3.40c.
1-3/16 to 1½ in.	2.90c.
1-9/16 to 1⅞ in.	2.75c.
1-15/16 to 2⅞ in.	2.60c.
2-15/16 to 6 in.	2.45c.

* In quantities of 10,000 to 19,000 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.75c.
No. 10, f.o.b. Gary	1.85c.
No. 10, del'd Phila.	2.04c.
No. 10, f.o.b. Birmingham	1.90c.
No. 10, f.o.b. dock cars Pacific ports	2.42½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Gary	2.35c.
No. 24, del'd Phila.	2.54c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, f.o.b. dock cars Pacific ports	2.95c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.30c.
No. 10 gage, f.o.b. Gary	2.40c.
No. 10 gage, del'd Phila.	2.59c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.00c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Gary	2.85c.
No. 20 gage, del'd Phila.	3.04c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.45c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Gary	2.95c.
No. 24, del'd Phila.	3.14c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, f.o.b. dock cars Pacific ports	3.55c.
No. 24 Wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.25c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c.
No. 28, Gary	2.75c.

Tin Plate *Base per Box*

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.80

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.75c.
All widths up to 24 in., Chicago	1.85c.
Cooperage stock, Pittsburgh	1.85c.
Cooperage stock, Chicago	1.95c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.40c.
F.o.b. Cleveland	2.40c.
Del'd Chicago	2.68c.
F.o.b. Worcester	2.60c.

Fender Stock

No. 20, Pittsburgh or Cleveland	3.10c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of $2 a ton is made to jobbers on straight, mixed or joint carloads; $3 a ton is allowed on less-than-carload shipments.

	Base per Keg
Standard wire nails	$2.35
Smooth coated nails	2.35
Galvanized nails:	
15 gage and coarser	4.35
16 gage and finer	4.85

	Base per 100 Lb.
Smooth annealed wire	$2.35
Smooth galvanized wire	2.70
Polished staples	3.05
Galvanized staples	3.30
Barbed wire, galvanized	2.85
Woven wire fence, base column	60.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	57	38½	¼ & ⅜	+1½	+21½
½	62	50½	½	31½	15
¾	65½	55½	¾	36½	20½
1 to 3	67½	58½	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	66½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	67½	57½	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

¼	48½	33½	⅛	+13	+45½
¼ to ⅜	54½	41½	¼ & ⅜	+2¼	+34½
½	60	51	½	32½	17½
¾	64½	53½	¾	37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 and 8	68	58	7 & 8	46	33
9 and 10	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		*Charcoal Iron*	
2 in. and 2¼ in.	33	1½ in.—1¾ in.	44
2½ in.—2¾ in.	40	2 in.—2¼ in.	13
3 in.	44	2½ in.—2¾ in.	16
3¼ in.—3½ in.	47	3 in.	17
4 in.	49	3¼ in. to 3½ in.	18
4½ in. to 6 in.	42	4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five. Exception: On 1½ to 1¾-in. charcoal iron tubes no supplementary discounts are granted, and the discount for 10,000 lb. to a carload is 4 points under base and for less than 10,000 lb. 8 points under base.

Standard Commercial Seamless Boiler Tubes
Cold-Drawn

1 in.	68	3 in.	38
1¼ to 1½ in.	68	3¼ to 3½ in.	41
1¾ in.	68	4 in.	43
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot-Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	47
2½ and 2¾ in.	40	4 in.	49
3 in.	44	4½, 5 and 6 in.	42

In the case of all sizes except 1-in. to 1¾-in. cold-drawn boiler tubes supplementary discounts of two 5 per cents are allowed on carload lots. On quantities up to 10,000 lb. the base discount is reduced 10 points and a supplementary discount of 5 per cent only is allowed. On quantities 10,000 lb. to 24,999 lb. the base discount is reduced 6 points and a supplementary discount of 5 per cent only is allowed. On 25,000 lb. to a carload the base discount is reduced 2 points and supplementary discounts of two 5 per cents are allowed.

On 1 to 1¾-in. cold-drawn boiler tubes, there are no supplementary discounts. On quantities up to 10,000 lb. the base discount is reduced 12 points; on 10,000 lb. to 24,999 lb., it is reduced 8 points; on 25,000 lb. to a carload it is reduced 2 points

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 3.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, 60-lb. and heavier, per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$32.00
Light rails (from rail steel) per gross ton	31.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh	70, 25 and 10
Stove bolts in packages, Chicago	70, 25 and 10
Stove bolts in packages, Cleveland,	70, 25 and 10
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets
(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago and Birmingham	2.85

Small Rivets
(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago and Birm'g'm	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 180 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screw, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screw, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws cut and oval point	75 and 10
Milled studs	65 and 5

STAINLESS STEEL

(18% Cr. 8% Ni. 0.08 to 0.12% C)
(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	33c.
Hot-rolled strip	20c.
Cold-rolled strip	27c.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham.

	Per Gross Ton
Rerolling	$26.00
Forging quality	31.00

Sheet Bars

F.o.b. Pittsburgh, Youngstown, Cleveland, Chicago, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open-hearth or Bessemer	$26.00

Skelp

F.o.b. Pittsburgh, Youngstown, Chicago, Buffalo, Coatesville, Pa., or Sparrows Point, Md.

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Pig Iron, Ores, Ferroalloys

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$36.00
Cleveland	36.00
Chicago	37.00
Birmingham	39.00
Youngstown (del'd)	37.00

ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b. Pittsburgh, Chicago, Buffalo, Massillon, Canton or Bethlehem.

Base price, $49 a gross ton except at Bethlehem, where it is $51.

CARBON STEEL FORGING INGOTS

F.o.b. Pittsburgh, Youngstown or Chicago.

Uncropped, $28 per gross ton.

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.50
Foundry, f.o.b. Connellsville Prompt	$4.25 to 5.25
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	10.50
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry by-product, Cleveland delivered	9.27
Foundry, Birmingham	4.75
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.55 to $1.80
Mine run coking coal f.o.b. W. Pa.	1.80 to 2.00
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.30
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.20
Steam slack, f.o.b. W. Pa. mines	1.30 to 1.40
Gas slack, f.o.b. W. Pa. mines	1.65 to 1.85

Fuel Oil

	Per Gal.
Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.00c.
Per Gal f.o.b. Cleveland	
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.06
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$44.00 to $45.00
4-in., del'd Chicago	47.00 to 48.00
6-in. and larger, del'd New York	43.00
4-in., del'd New York	46.00
6-in., and larger, Birmingham,	36.00 to 37.00
4-in. Birmingham	39.00 to 40.00

Class "A" and gas pipe, $3 extra.

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$18.50	$19.00	$18.00	$19.50
Bethelehem, Pa.	18.50	19.00	18.00	19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	....	18.00	....
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown	17.50	17.50	17.00	18.00
Buffalo	17.50	18.00	16.50	18.50
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, Ohio	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
Hamilton, Ohio	17.50	17.50	17.00	18.00
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	....
Duluth, Minn.	18.00	18.00	....	18.50
Birmingham	13.50	....	12.50	....
Provo, Utah	16.50	....	....	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass	$19.00	$19.50	$18.50	$20.00
From Buffalo	19.00	19.50	18.50	20.00
Brooklyn				
From East. Pa. or Buffalo	20.77	21.27	20.27	21.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo	19.89	20.39	19.39	20.89
Philadelphia				
From Eastern Pa.	19.26	19.76	18.76	20.26
Cincinnati				
From Hamilton, Ohio	18.51	18.51	18.01	19.01
Canton, Ohio				
From Cleveland and Youngstown	18.76	18.76	....	....
Columbus, Ohio				
From Hamilton, Ohio	19.50	19.50	....	....
Mansfield, Ohio				
From Cleveland and Toledo	19.26	19.26	....	....
Indianapolis				
From Hamilton, Ohio	19.77	19.77	....	....
South Bend, Ind.				
From Chicago	19.55	19.55	....	....
Milwaukee				
From Chicago	18.50	18.50	....	....
St. Paul				
From Duluth	19.44	....	....	....
Davenport, Iowa				
From Chicago	19.26	19.26	....	....
Kansas City				
From Granite City	20.04	20.54	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N.Y. $23.00
Johnson City, Tenn. 23.00
Del'd Chicago 28.65

GRAY FORGE PIG IRON

Valley furnace $17.50

CHARCOAL PIG IRON

Lake Superior furnace $20.50
Delivered Chicago 23.54
Delivered Buffalo 23.78

CANADA

Pig Iron

Per gross ton:

	Delivered Toronto
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carload)	$85.00
Domestic, 80%, seaboard, (ton lots)	92.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$22.25	12%	$29.25
7%	22.25	13%	30.75
8%	24.25	14%	32.25
9%	25.25	15%	33.75
10%	26.25	16%	35.25
11%	27.75	17%	36.75

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$27.25	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.25 to $1.25
Ferrotungsten, less carloads	1.30 to 1.35
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace, carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	24c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid, delivered*	$15.00
Tungsten, domestic scheelite, delivered	$14.50 to $15.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$15.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	18.50
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.00 to $13.50
No. 2 heavy melting steel	11.50 to 12.00
No. 2 railroad wrought	13.50 to 14.00
Scrap rails	13.50 to 14.00
Rails 3 ft. and under	14.50 to 15.00
Sheet bar crops, ordinary	14.00 to 14.50
Compressed sheet steel	13.00 to 13.50
Hand bundled sheet steel	11.50 to 12.00
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	9.50 to 10.00
Short shov. steel turnings	9.50 to 10.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	11.50 to 12.00
No. 1 cast	12.00 to 12.50
Railr. knuckles and couplers	15.00 to 15.50
Rail, coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet crops	16.00 to 16.50
Low phos. sheet bar crops	15.50 to 16.00
Low phos. plate scrap	14.50 to 15.00
Low phos. punchings	15.00 to 15.50
Steel car axles	14.50 to 15.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.50 to $11.00
Shoveling steel	10.50 to 11.00
Hydraulic comp. sheets	$9.25 to $9.75
Drop forge flashings	8.50 to 9.00
No. 1 busheling	9.25 to 9.75
Rolled carwheels	11.50 to 12.00
Railroad tires	11.50 to 12.00
Railroad leaf springs	11.00 to 11.50
Axle turnings	8.50 to 9.00
Steel couplers and knuckles	11.50 to 12.00
Coil springs	12.00 to 12.50
Axle turnings (elec. fur.)	9.25 to 9.75
Low phos. punchings	12.50 to 13.00
Low phos. plates, 12 in. and under	12.50 to 13.00
Cast iron borings	6.50 to 7.00
Short shoveling turnings	6.75 to 7.25
Machine shop turnings	6.50 to 7.00
Rerolling rails	11.50 to 12.00
Steel rails, less than 3 ft.	12.25 to 12.75
Steel rails, less than 2 ft.	12.75 to 13.25
Angle bars, steel	11.50 to 12.00
Cast iron carwheels	11.00 to 11.50
Railroad malleable	11.50 to 12.00
Agricultural malleable	9.00 to 9.50

	Per Net Ton
Iron car axles	$12.00 to $12.50
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	9.25 to 9.75
No. 2 railroad wrought	9.25 to 9.75

No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	5.25 to	5.75
No. 1 machinery cast	9.50 to	10.00
Clean automobile cast	9.00 to	9.50
No. 1 railroad cast	9.00 to	9.50
No. 1 agricultural cast	8.00 to	8.50
Stove plate	7.50 to	8.00
Grate bars	6.50 to	7.00
Brake shoes	8.50 to	9.00

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting steel	....	9.50
No. 1 railroad wrought	....	11.00
Bundled sheets	....	9.50
Hydraulic compressed, new	9.50 to	10.00
Hydraulic compressed, old	7.00 to	7.50
Machine shop turnings	....	7.50
Heavy axle turnings	10.00 to	10.50
Cast borings	5.50 to	6.00
Heavy breakable cast	11.50 to	12.00
Stove plate (steel works)	....	9.50
No. 1 low phos. heavy	14.50 to	15.00
Couplers and knuckles	14.00 to	14.50
Rolled steel wheels	14.00 to	14.50
No. 1 blast furnace	5.50 to	6.00
Spec. iron and steel pipe	10.00 to	10.50
Shafting	....	16.50
Steel axles	....	14.50
No. 1 forge fire	11.00 to	11.50
Cast iron car wheels	12.50 to	13.00
No. 1 cast	13.00 to	13.00
Cast borings (chem.)	12.00 to	14.00
Steel rails for rolling	....	13.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.75 to	$11.25
No. 2 heavy melting steel	10.25 to	10.75
Compressed sheet steel	10.00 to	10.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	9.50 to	10.00
Machine shop turnings	8.00 to	8.50
Short shoveling turnings	8.25 to	8.75
No. 1 busheling	9.50 to	10.00
Steel axle turnings	8.50 to	9.00
Low phos. billet crops	12.50 to	13.00
Cast iron borings	8.25 to	8.75
Mixed borings and short turnings	8.25 to	8.75
No. 2 busheling	8.25 to	8.75
No. 1 cast	10.50 to	11.00
Railroad grate bars	6.50 to	7.00
Stove plate	7.50 to	8.00
Rails under 3 ft.	14.00 to	14.50
Rails for rolling	14.00 to	14.50
Railroad malleable	11.75 to	12.00
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	....	$11.00
No. 2 heavy melting scrap	$9.50 to	10.00
Scrap rails	10.50 to	11.00
New hydraul. comp. sheets	9.50 to	10.00
Old hydraul. comp. sheets	6.50 to	7.00
Drop forge flashings	9.50 to	10.00
No. 1 busheling	9.50 to	10.00
Hvy. steel axle turnings	8.50 to	9.00
Machine shop turnings	6.75 to	7.25
Knuckles and couplers	12.00 to	12.50
Coil and leaf springs	12.00 to	12.50
Rolled steel wheels	12.00 to	12.50
Low phos. billet crops	13.50 to	14.00
Short shov. steel turnings	7.50 to	8.00
Short mixed borings and turnings	7.50 to	8.00
Cast iron borings	7.50 to	8.00
No. 2 busheling	6.50 to	7.00
Steel car axles	12.00 to	12.50
Iron axles	11.00 to	12.00
No. 1 machinery cast	12.00 to	13.00
No. 1 cupola cast	11.00 to	11.50
Stove plate	9.75 to	10.25
Steel rails, 3 ft. and under	12.50 to	13.00
Cast iron carwheels	11.00 to	11.50
Industrial malleable	11.50 to	12.00
Railroad malleable	12.00 to	13.00
Chemical borings	9.00 to	10.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	....	$10.00
Scrap steel rails	....	9.00
Short shoveling turnings	....	5.50
Stove plate	$7.00 to	7.50
Steel axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 railroad wrought	....	7.00
Rails for rolling	....	10.50
No. 1 cast	9.00 to	9.50
Tramcar wheels	9.00 to	9.50
Cast iron borings, chem	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$10.50 to	$11.00
No. 1 heavy melting	9.00 to	9.50
No. 2 heavy melting	8.50 to	9.00
No. 1 locomotive tires	8.00 to	8.50
Misc. stand.-sec. rails	10.75 to	11.25
Railroad springs	11.50 to	12.00
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	9.00 to	9.50
No. 1 busheling	6.50 to	7.00
Cast iron borings and shoveling turnings	4.50 to	5.00
Rails for rolling	11.00 to	11.50
Machine shop turnings	4.25 to	4.75
Heavy turnings	5.50 to	6.00
Steel car axles	10.75 to	11.25
Iron car axles	12.50 to	12.00
Wrot iron bars and trans.	9.75 to	10.25
No. 1 railroad wrought	6.75 to	7.25
Steel rails less than 3 ft.	12.50 to	13.00
Steel angle bars	11.50 to	12.00
Cast iron carwheels	8.50 to	9.00
No. 1 machinery cast	9.00 to	9.50
Railroad malleable	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Relay rails, 60 lb. and under	16.00 to	16.50
Relay rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	9.00 to	9.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$6.50 to	$7.00
Scrap T rails	6.50 to	7.00
Machine shop turnings	3.00 to	3.25
Cast iron borings	4.00 to	4.25
Bundled skeleton, long	4.50 to	5.00
Forge flashings	5.00 to	5.50
Blast furnace scrap	2.75 to	3.00
Shafting	9.50 to	10.00
Steel car axles	9.75 to	10.00
Wrought pipe	4.50 to	4.75
Rails for rerolling*	14.00 to	14.50
Stove plate	4.50 to	4.75
Cast iron borings, chemical	9.00 to	9.50
Per gross ton delivered consumers' yards:		
Textile cast	$10.00 to	$10.50
No. 1 machinery cast	10.00 to	10.50
Railroad malleable	11.00 to	11.50

*Delivered Eastern Pennsylvania points.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.50 to	$9.00
No. 2 heavy melting steel	6.00 to	7.50
Heavy breakable cast	7.50 to	8.00
No. 1 machinery cast	8.00 to	8.50
No. 2 cast	6.50 to	7.00
Stove plate	5.50 to	5.75
Steel car axles	10.50 to	10.75
No. 1 railroad wrought	7.50 to	8.00
No. 1 yard wrought, long	$6.50 to	$7.00
Spec. iron and steel pipe	5.75 to	6.00
Forge fire	5.50 to	6.00
Rails for rerolling	8.00 to	8.50
Short shoveling turnings	3.00 to	3.50
Machine shop turnings	3.50 to	3.75
Cast borings	4.50 to	4.75
No. 1 blast furnace	2.50 to	3.00
Cast borings (chemical)	11.00 to	11.50
Unprepared yard iron and steel	4.50 to	5.00
Per gross ton, delivered local foundries:		
No. 1 machinery cast		$11.00
No. 1 hvy. cast (cupola size)		10.00
No. 2 cast		9.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$8.25 to	$9.00
Scrap rails for melting	9.00 to	9.50
Loose sheet clippings	4.75 to	5.25
Bundled sheets	6.00 to	6.50
Cast iron borings	6.00 to	6.50
Machine shop turnings	5.50 to	6.00
No. 1 busheling	6.50 to	7.00
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.50 to	10.00
No. 1 locomotive tires	9.00 to	9.50
Short rails	11.75 to	12.25
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	9.50 to	10.00
No. 1 railroad cast	9.00 to	9.50
Burnt cast	6.50 to	7.00
Stove plate	6.50 to	7.00
Agricultural malleable	8.50 to	9.00
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$9.00 to	$9.50
Borings and short turnings	7.00 to	7.50
Long turnings	6.00 to	6.50
No. 1 machinery cast	9.50 to	10.00
Automotive cast	10.50 to	11.00
Hydraul. comp. sheets	9.25 to	9.75
Stove plate	6.50 to	7.00
New factory busheling	8.00 to	8.50
Old No. 2 busheling	5.50 to	6.00
Sheet clippings	6.50 to	7.00
Flashings	7.50 to	8.00
Low phos. plate scrap	9.75 to	10.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails, scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.00
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.05c.
Structural shapes	3.05c.
Soft steel bars and small shapes	2.85c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands, under ¼ in.	3.10c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.15c.
Galv. sheets (No. 24), 25 or more bundles	3.70c.
Hot-rolled sheets (No. 10)	2.85c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.90c.
Small	2.65c.
Bolts	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.25
Wire, black, soft ann'l'd, base per 100 lb.	2.90
Wire, galv. soft, base per 100 lb.	3.35
Common wire nails, per keg	2.65
Cement coated nails, per keg	2.65

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	2.90c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.40c.
Flats and squares	3.40c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.20c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.30c.
Hot-rolled sheets (No. 10)	2.85c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3c.
Rivets, boiler (keg lots)	3.10c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq., tap. or blank	60 and 5
Hot-pressed nuts, hex., tap. or blank	60 and 5
Hex. head and cap screws	50
Cup point set screws	70
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	$2.75
Com. wire nails, base per keg	2.70c.
Cement c't'd nails, base per keg	2.70c.

NEW YORK

	Base per Lb.
Plates	3.30c.
Structural shapes	3.27c.
Soft steel bars, small shapes	3.17c.
Iron bars	3.24c.
Iron bars, swed. charcoal	6.50 to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	4.00c.
Hoops	3.42c.
Bands	3.42c.
Hot-rolled sheets (No. 10)	3.17c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.25c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.30c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ½ x ½ in. and larger	3.50c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.00
	Per Cent Off List
Machine bolt, cut thread:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	60
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50
	Per 100 Ft.
Boiler tubes:	
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST LOUIS

	Base per Lb.
Plates and struc. shapes	3.34c.
Bars, soft steel or iron	3.14c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Galv. sheets (No. 24)	4.54c.
Hot-rolled sheets (No. 10)	3.19c.
Black corrug. sheets (No. 24)	3.99c.
*Galv. corrug. sheets	4.59c.
Structural rivets	3.59c.
Boiler rivets	3.69c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	60
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.75c.
*Structural shapes	2.75c.
*Soft steel bars, small shapes, iron bars (except bands)	2.75c.
‡Reinforc. steel bars, sq. twisted and deformed	2.505c.
Cold-finished steel bars	3.75c.
*Steel hoops	3.30c.
*Steel bands, No. 12 to 3/16 in., incl.	3.05c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.40c.
†Galvanized sheets (No. 24)	4.00c.
*Hot-rolled annealed sheets (No. 10)	2.95c.
Diam. pat. floor plates, ¼ in.	4.75c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For 5 tons or more, exclusive of cutting charge.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.21c.
Soft steel bars	2.90c.
Reinforc. steel bars	2.00c. to 2.50c.
Cold-finished steel bars	3.40c.
Flat rolled steel under ¼ in.	3.26c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.76c.
Galvanized sheets (No. 24)	4.36c.
Hot-rolled sheets (No. 10)	3.01c.
Black ann'l'd wire, per 100 lb.	$2.45
No. 9 galv. wire, per 100 lb.	2.80
Com. wire nails, base per keg	2.45

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.30c.
Bars, soft steel or iron	3.10c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c.
Hoops and bands, 3/16 in. and lighter	3.35c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.45c.
Hot-rolled sheets (No. 10)	3.10c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	6.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.69
4-in.	41.23
Lap-welded steel boiler tubes, 2-in.	16.43
4-in.	38.31

BUFFALO

	Base per Lb.
Plates	3.27c.
Struc. shapes	3.15c.
Soft steel bars	2.95c.
Reinforcing bars	1.95c.
Cold-fin. flats and sq.	3.35c.
Rounds and hex.	3.25c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.15c.
Bands	3.32c.
Hoops	3.32c.
Hot-rolled unannealed sheets	3.07c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.43c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.85c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.25c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.65c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	3.50c.	3.40c.	3.40c.
Shapes, standard	3.50c.	3.40c.	3.40c.
Wide-flanged beams and columns	3.70c.	3.60c.	3.60c.
Soft steel bars	3.55c.	3.40c.	3.40c.
Reinforcing bars	3.10c.	3.15c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.25c.	4.15c.	4.35c.
Hot - rolled sheets (No. 10)	3.75c.	3.65c.	3.65c.
Galv. sheets (No. 24)	4.85c.	4.75c.	4.85c.
Struc. rivets, ½ in. and larger	6.25c.	6.00c.	5.00c.
less than 100 lb.			
Cold finished steel Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg	$3.35	$3.25	$3.45
less carload			

All items subject to differentials for quantity.

Fabricated Structural Steel

Awards Decline—New Projects in Good Volume

STRUCTURAL steel lettings of 9850 tons were mostly in small tonnages and compare with 18,800 tons a week ago. The largest bookings include 2000 tons for a Government bridge at Wyola (Fort Peck), Mont., 1405 tons for the Park Street Bridge at Oakland, Cal., and 1100 tons for a dam in the Mississippi River at Guttenberg, Iowa. New projects of 19,450 tons are the largest for any corresponding period since the last week in December. Inquiries include 5400 tons for Government radio towers in Hawaii and the Canal Zone, 4000 tons for a bridge at Omaha, Neb., and 1400 tons for two buildings at the World's Fair, Chicago, for the Ford Motor Co. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Sonyea, N. Y., 370 tons, State hospital building, to Bethlehem Fabricators, Inc.

Albion, N. Y., 350 tons, State hospital, to Bethlehem Fabricators, Inc.

Elmira, N. Y., 155 tons, grade crossing, to R. S. McManus Steel Construction Co.

Comstock, N. Y., 340 tons, prison addition, to Belmont Iron Co.

THE SOUTH

Montgomery, Ala., 160 tons, highway bridge, to Virginia Steel & Iron Co.

Fort Benning, Ga., 430 tons, hangar and boiler house, to Ingalls Iron Works.

CENTRAL STATES

Shelby, Ohio, 100 tons, power house, to Paterson Engineering Co., Detroit.

Cleveland, 180 tons, addition for Winton Motor Works, to Austin Co.

Tula, Mich., 130 tons, State highway bridge, to McClintic-Marshall Corpn.

Springfield, Ill., 175 tons, bridge, to McClintic-Marshall Corpn.

Guttenberg, Iowa, 1100 tons, dam across Mississippi River, to McClintic-Marshall Corpn.

Dunbar, Iowa, 150 tons, bridge, to Omaha Steel Works.

Fairbanks, Iowa, 150 tons, bridge, to Clinton Bridge Works.

Phelps and Franklin Counties, Mo., 435 tons, highway bridges, to Stupp Brothers Bridge & Iron Co.

State of Nebraska, 400 tons, bridge, to Omaha Steel Works.

WESTERN STATES

Wyola (Fort Peck), Mont., 2000 tons, Government bridge, to McClintic-Marshall Corpn., and 900 tons of piling to Bethlehem Steel Co.

State of Montana, 190 tons, bridges in four counties, to unnamed bidders.

State of Colorado, 140 tons, bridges in two counties, to unnamed bidders.

San Bernardino, Cal., 150 tons, Montgomery-Ward building, to Consolidated Steel Corpn.

Oakland, Cal., 1405 tons, Park Street bridge, to Moore Dry Dock Co.

Los Angeles, 200 tons, corporation yards, to Consolidated Steel Corpn.

Coos County, Ore., 115 tons, State bridge over Coquille River, to an unnamed bidder.

Jackson County, Ore., 145 tons, State bridge over Applegate River, to an unnamed bidder.

Coco Solo, Canal Zone, 850 tons, seaplane hangar, to Ingalls Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

New York, 12,300 tons, Midtown Post Office annex, readvertised fourth time; bids close Feb. 21.

Buffalo, 350 tons, Erie County bridges; McClintic-Marshall Corpn. low bidder.

Gordon, Pa., 160 tons, bridge for Reading Railroad; bids **Feb. 13.**

Philadelphia, 1000 tons, Richmond station for Philadelphia Electric Co.; bids to be opened soon.

Pittsburgh, 1100 tons, ramps for post office; Aronberg-Fried Corpn., general contractor.

Treichlersville, Pa., 1200 tons, State highway bridge.

State of Pennsylvania, 900 tons, four highway bridges.

Washington, 5400 tons, radio towers in Panama Canal Zone and Hawaii for Government; bids Feb. 14.

Aberdeen, Md., 175 tons, Government hangars.

THE SOUTH

Illinois Central Railroad, 1000 tons, bridges at Goodhope and LaBranche, La.

CENTRAL STATES

Cleveland, 1000 tons, stadium for Western Reserve University and Case School of Applied Science.

North Randall, Ohio, 270 tons, bridge for Erie Railroad.

Chicago, 1400 tons, two buildings for Ford Motor Co. at Century of Progress; previously reported as 400 tons.

State of Illinois, 400 tons, bridges.

Omaha, Neb., 4000 tons, highway bridge.

WESTERN STATES

Santa Rosa, Cal., 390 tons, County bridge over Russian River; bids Feb. 9.

Oakland, Cal., 225 tons, Broadway low level tunnel; bids March 22.

Los Angeles, 250 tons sheet piling, two bridges for Santa Fe Railroad; bids soon.

Los Angeles, 120 tons, tunnel supports for Metropolitan Water District, Specification M-2022; bids under advisement.

Santa Barbara, Cal., 150 tons sheet piling, pier for Pacific Western Oil Co.; general contract awarded.

Mount Vernon, Wash., 200 tons, County bridge over Swinomish Slough; bids Feb. 9.

Everett, Wash., 150 tons, County bridge over Stillaguamish River; bids under advisement.

FABRICATED PLATE

AWARDS

Aberdeen, Md., 250 tons, water tank at proving grounds; bids opened Feb. 5.

East Greenville, Pa., 120 tons, water tank, to Chicago Bridge & Iron Works.

Kaukauna, Wis., 120 tons, elevated water tank, to Pittsburgh-Des Moines Steel Co.

Kansas City, Kan., 500 tons, tanks, to an unnamed bidder.

Mare Island, Cal., 100 tons, two boilers at Navy Yard, to Alta Electric & Mechanical Co.

Hamilton Field, Cal., 100 tons, gasoline storage system at bombing base, to Bennett & Taylor.

NEW PROJECTS

Cincinnati, 100 tons, widening of two tow boats for United States Engineer; bids Feb. 16.

Milwaukee, 150 tons, main air header for municipal sewage plant; Cream City Boiler Co., Milwaukee, low bidder.

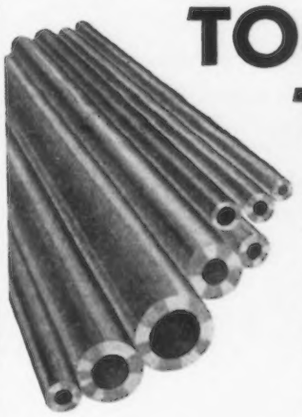
Vicksburg, Miss., 300 tons, two mooring barges for United States Engineer; bids Feb. 15.

Kansas City, Mo., 100 tons, six 40-ft. launches for United States Engineer; bids Feb. 26.

Honolulu, 200 tons, pipe line for American Factors, Ltd.; general contract awarded.

NON-SHRINK, OIL HARDENING

TOOL STEEL TUBING



The job of making ring dies, cutting dies, bushings spacers, etc., is half done when you start with Bissett Tool Steel Tubing. There is a size carried in stock to meet every requirement up to 12" O.D. and 2" wall thickness. Larger sizes can be supplied.

It eliminates forging, does away with annealing difficulties and cuts down machining cost.

We also supply special tubing to S.A.E. 52100 and S.A.E. 4615 analysis for Ball Bearing purposes.

Manufacturers of BISCO Tungsten Carbide and Tantalum Carbide drawing dies for wire, rod and tubing.

THE BISSETT STEEL CO., INC.

945 E. 67th STREET, CLEVELAND, O.

Cincinnati Pittsburgh Buffalo

PLANT EXPANSION AND EQUIPMENT BUYING

Tool Inquiries Continue in Volume Some Builders Feel Labor Shortage

INQUIRIES for machine tools continue in good volume and well diversified geographically, although the past week has given no definite indication of an upswing in orders. At Cincinnati, builders are operating on a level of approximately 30 per cent of capacity, with single machine sales predominating for radial drills, milling machines and grinders.

Cleveland dealers report that the supply of good used tools is being rapidly absorbed, which should have an effect upon the demand for new tools during the coming months. In this district also, the prevailing run of business is for single tools.

The tool industry in Chicago continues to hold recent gains, but considerable inquiry which came out during the first weeks of the year has not yet eventuated in orders.

The Milwaukee Board of Education has issued the following list:

One—11-in. lathe.
Two—Bench drills, 3½-in. capacity.
One—Floor grinder, two ½ in. × 6 in. wheels.
One—Floor grinder, two 7 in. × ¾ in. wheels.
One—Oil-stone grinder.
Ten—Wood turning lathes ranging in size from 12 in. × 24 in. to 12 in. × 60 in.
One—12 in. jointer.
One—Band saw with 30 in. disk.

Trustees of the St. Louis - San Francisco Railway have petitioned the United States District Court at St. Louis for authority to make expenditures for additions and betterments during 1934 totaling $1,671,719, including shop machinery and tools, amounting to $30,873.

NORTH ATLANTIC

American Can Co., 230 Park Avenue, New York, has leased 14,000 sq. ft. in building at 930 Newark Avenue, Jersey City, N. J., for storage and distribution.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until Feb. 20 for 54 steel buoy bodies, from 9 ft. diameter by 38 ft. long, to 5 ft. diameter by 15 ft. long, majority with skeleton lantern towers and bottom counterweights.

State Department of Mental Hygiene, State Office Building, Albany, N. Y., asks bids until Feb. 28 for power house equipment, electrical fixtures, heating equipment, etc., for Pilgrim State Hospital, Pine Aire, N. Y.

Harry Moore Auto Body Corpn., New York, has been organized by Harry C. Moore, 6 Fulton Street, Weehawken, N. J., and associates, to manufacture commercial automobile bodies, parts, etc.

Steel Tube Products Co., Brooklyn, has leased one-story building at 814-16 Bergen Street, for new plant.

Climax Molybdenum Co., 295 Madison Avenue, New York, is considering extensions and improvements in properties at Climax, near Denver, including new type flotation machines, regrinding equipment, steam power and other machinery. Cost about $50,000.

John Andrea, New York, manufacturer of automobile radio equipment and accessories, has leased space in building at 514-16 West Fifty-seventh Street for new plant.

Super Automatic Oil Heater Corpn., New York, has been organized by Herman Germain, 3-5 West Eighteenth Street, and Jack Studner, 865 West End Avenue, to manufacture oil heaters and parts.

Simmons Co., 230 Park Avenue, New York, manufacturer of metal beds, springs, etc., with main plant at Kenosha, Wis., has let general contract to Atlantic States Construction Co., 201 Luckie Street, N. W., Atlanta, Ga., for one-story addition to branch factory at Atlanta, 25 x 150 ft. Cost about $65,000 with equipment. Morgan, Dillon & Lewis, Grant Building, Atlanta, are architects.

Department of Docks, Pier A, North River, New York, is planning new steel freight and passenger terminal, 100 x 866 ft., foot of West Tenth Street, North River, with conveying, elevating and other material-handling equipment, power facilities, etc. Fund of $1,282,000 is being arranged through Federal aid.

Busi Mfg. Corpn., New York, has been organized by Irving Brody, 693 East Seventh Street, and Max Orda, 535 Parkside Avenue, both Brooklyn, to manufacture machinery and parts.

Columbia Stamping Products Co., Long Island City, New York, has leased floor in building at Fortieth Avenue and Twenty-first Street, for manufacture of stamped metal goods.

Superior Screw & Bolt Co., East Ninety-third Street and Aetna Road, Cleveland, manufacturer of bolts, studs, screws, etc., has leased one-story building at Jelliff Avenue and East Bigelow Street, Newark, N. J., about 5000 sq. ft. floor space, for new eastern branch plant.

Borough Council, Princeton, N. J., has authorized fund of $35,000 for new municipal incinerator, with furnaces, conveying, elevating and other equipment.

Electric Transformer Corpn., Jersey City, N. J., has been organized by William Ebeling and G. A. Weber, 200 Central Avenue, to manufacture transformers, parts and allied electrical equipment.

Whitehouse Brothers, 175 Vanderpool Street, Newark, N. J., manufacturer of metal buckles and kindred products, has leased floor in building at 41-45 Austin Street, and will move to new location.

Aviation Committee, Chamber of Commerce, Atlantic City, N. J., is at head of project to erect new super-airport on Great Island, near city, where tract of over 400 acres will be used for airplane and seaplane bases, hangars, repair and reconditioning shops, and other field units. It is proposed to arrange for Federal financing.

Samuel J. Eskin, Philadelphia, has leased two-story factory at 1310 Germantown Avenue, for production of commercial automobile and truck bodies.

Sun Oil Co., 1608 Walnut Street, Philadelphia, is planning new oil refinery on 250-acre tract now being acquired at Texas City, Tex., to consist of main refinery, storage and distributing units, pumping station, pipe lines from south Texas oil fields in Starr County to refinery site, and other structures. Entire project will cost over $600,000 with equipment.

Marmon Philadelphia Co., 667 North Broad Street, Philadelphia, representative for Marmon Automobile, has leased five-story building at 1327 Fairmount Avenue, for new service, parts, repair and sales headquarters.

NEW ENGLAND

State Executive Department, State House, Boston, has plans for new one-story artillery building and shop, 150 x 260 ft., at State Armory, Natick, Mass. Cost $114,000 with equipment. Federal financing has been arranged.

Town Building Committee, Wayland, Mass., plans manual training department in new high school. Cost $100,000. Federal financing is being arranged. Frank Irving Cooper Corpn., 47 Winter Street, Boston, is architect.

Coburn Trolley Track Co., Holyoke, Mass., has been organized to manufacture track and conveying systems, and kindred equipment, with Leland C. Allen, president, and Austin N. Kirkpatrick, treasurer. New organization will take over Coburn Trolley Track Mfg. Co., with local plant.

State Department of Mental Diseases, State House, Boston, plans new equipment storage and distributing building, with shop facilities, at Tewksbury State Infirmary, Tewksbury, Mass. Cost $149,000 with equipment; also, new water supply system at same institution, with pumping machinery and accessories, pipe lines, etc., to cost $80,000. Federal financing is being arranged.

Formatic Co., Waterbury, Conn., has been organized by Arvid T. Peterson, 501 Watertown Avenue, Watertown, Conn., and Philip R. Pratt, 101 Walnut Street, Naugatuck, Conn., to manufacture metal products, tools and other equipment.

School Commission, Dudley, Mass., plans manual training department in new two-story and basement junior high school. Cost about $185,000. Towner & Sellew, 329 Main Street, Middletown, Conn., are architects.

Sanders Engineering Co., Portland, Me., has been awarded $3,000,000 contract for construction of a water-works system for Bogota, Colombia. Work will require two years for completion, and equipment will be shipped by steamer from Portland early in spring.

BUFFALO DISTRICT

William E. Kreiner & Sons, Inc., 467 Spring Street, Buffalo, malt products, plans rebuilding part of plant recently destroyed by fire. Loss about $100,000 ,with equipment. William E. Kreiner, Jr., is secretary and treasurer.

De Boer Mfg. Co., Inc., Syracuse, N. Y., has been organized by J. Henry De Boer, Syracuse, and associates, to manufacture metal chair braces, bed rails, and kindred metal goods. New company will take over organization of same name with plant at South State Street and Woodland Avenue.

Industrial Distilling Co., Waterloo, N. Y., recently organized by Henry M. Naylon, Buffalo, to take over former plant of Duffy's Malt Whiskey, plans extensions and improvements, including equipment. Cost over $60,000. It is proposed to have plant ready for production in about two months.

MIDDLE WEST

Central Can Co., 4527 West Lake Street, Chicago, manufacturer of tin and metal cans, has leased about 25,500 sq. ft. in building at 2419 West Nineteenth Street, for new plant and will remove to new location.

Distilled Products, Inc., Chicago, recently organized, has leased four-story building at 108-114 West Illinois Street, 80 x 100 ft., totaling 40,000 sq. ft. floor space, for new rectifying, blending, storage and distributing plant.

Joy Ball Bearing Corpn., 4550 Fulton Street, Chicago, has been organized by Clarence T. and L. R. Olson, to manufacture ball bearings and kindred equipment.

Northern States Power Co., 15 South Fifth Street, Minneapolis, has approved plans for new high-tension transmission line from point near Jim Falls to Chetek, Wis., and vicinity. Cost about $150,000 with equipment.

Coca Cola Bottling Co., 14 First Avenue, N. W., Watertown, S. D., plans new one-story bottling works. Cost about $25,000 with equipment.

Common Council, Exira, Iowa, is planning new municipal electric light and power plant.

LIGHT *crates for* **HEAVY** *loads*

Tin mill type of pickling crate constructed entirely of rolled Monel Metal by YOUNGSTOWN WELDING & ENGINEERING CO., Youngstown, Ohio. These crates, designed for individual capacity of 3,500 lbs. cold rolled steel plate, weigh approximately 1,365 lbs. each. They are used in 3 to 5% solution of sulphuric acid at 185° F.

112 Spacer Bars no problem in this tin mill pickling crate . . . it's ROLLED MONEL METAL

● Look at the crate shown above. Slender as these bars may be, don't think that acid will soon eat them up.

Remember, *this* crate is built of rolled Monel Metal.

Strength and chemical stability

It's not necessary to make a pickling crate so heavy that each load is practically all crate and no product! Make it of rolled Monel Metal.

Monel Metal resists corrosion so stubbornly that there's no need to build in excessive thickness for the pickling bath to eat away.

Neither is excessive thickness needed to carry heavy loads. Light bars of this steel-strong high Nickel alloy are more than adequate.

Furthermore, Monel Metal's resistance to corrosion is about your surest guarantee that the bath will clean your product thoroughly.

Thorough Cleaning — No Plating

The cleaning action is not impeded, either chemically or electrolytically, by Monel Metal. The crate won't plate your product.

Monel's resistance to hot sulphuric and cold muriatic acids, *plus* great strength are well known to Youngstown Welding & Engineering Company, which specializes in pickling equipment. Performance records lead that company to urge rolled Monel Metal for all its important installations.

The tin mill type of crate shown above is a "Youngstown" product... one of a battery of four recently built for Follansbee Brothers Company, of Follansbee, West Va.

Let us tell you about some of the interesting case-histories of Monel's performance... both in pickling crates and tank tie-rods... under the severest pickling room conditions. Just drop us a line.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

• • •

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed by International Nickel.

MONEL METAL

MONEL METAL

NRA

Cost about $75,000 with equipment. Federal financing will be arranged.

Common Council, Glenwood Springs, Colo., plans new hangar at municipal airport, with reconditioning and repair facilities.

Town Council, Mohall, N. D., will have plans drawn for new municipal electric lighting plant. Fund of $40,000 has been authorized at recent special election.

Architectural Committee, City Plan Commission, City Hall, Chicago, John Wentworth, chairman, plans new municipal airport on Lake front opposite Sixteenth Street, to include hangars, repair and reconditioning shops, oil storage and distribution units and other structures. Entire project will cost $8,500,000 and application will soon be made for Federal financing in that sum. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are architects. Hugh Young is engineer for Commission.

Roaring Fork Water, Light & Power Co., Aspen, Colo., plans transmission line to new Taylor River Conservation Dam, for which power contract has been secured. Cost about $100,000 with equipment.

Gibson Cannery Co., Gibson, Ill., is planning new distillery plant of several units. Cost over $100,000. Application has been made to Federal Alcohol Control Administration for permission.

Milwaukee Road, Chicago, has placed general contract with Thorgerson & Erickson, 228 South LaSalle Street, Chicago, for repairing fire damage estimated at $100,000 in car and locomotive plant at Milwaukee. K. L. Nystrom is superintendent of department.

Century Brewing Co., 2318 North Thirtieth Street, Milwaukee, will start work shortly on $480,000 enlargement program, following acquisition of controlling interest by William A. Gettelman and associates. First new unit will be 80 x 124 ft., 80 ft. high, housing brew house, stock cellar, boiler and engine rooms.

Continental Distilleries, Inc., Cudahy, suburb of Milwaukee, has been incorporated with $250,000 capital to acquire main building of Federal Rubber Co., containing 400,000 sq. ft. of floor space, and remodel into distillery. Harry Whitesell, St. Paul, Minn., is in charge of engineering.

SOUTH ATLANTIC

City Council, Charlotte, N. C., J. B. Bridgen, city manager, asks bids until Feb. 15 for 126 fire alarm boxes, with poles, cross arms, wiring for circuits, etc.

Commissioners of Public Works, Spartanburg, S. C., W. W. Griffin, chairman, asks bids until Feb. 15 for elevated water tank, 1,000,000-gal. capacity.

Smith's Heating System, Inc., Kinston, N. C., has been organized by Forrest H. Smith, Kinston, and associates, to manufacture heating equipment and systems.

City Council, George J. Roark, city manager, Pensacola, Fla., plans installation of pumping machinery and auxiliary equipment, pipe lines and fittings for extensions and improvements in municipal waterworks. Fund of $370,000 is being arranged through Federal aid for this and other municipal work.

Board of Trustees, Berry School, Rome, Ga., plans one-story equipment storage and distribution building, with shop facilities, 45 x 175 ft., with wing extension, 50 x 55 ft. Cost over $50,000 with equipment. Cooper & Cooper, Forsyth Building, Atlanta, Ga., are architects.

SOUTH CENTRAL

Great Southern Distilling Co., Inc., 427 Carondelet Street, New Orleans, has taken over former factory of Dunbar Molasses Co., Chartes and Piety Streets, and will remodel for distillery. New storage and distribution building will be erected. Cost about $125,000 with equipment.

Director of Purchases, Tennessee Valley Authority, New Sprankle Building, Knoxville, Tenn., asks bids until Feb. 13 for metal batchers for concrete aggregates for weighing equipment at concrete mixing plant, Norris Dam, near Coal Creek, Tenn.

Kentucky Richland Distilling Co., Carrollton, Ky., plans new distillery. Cost over $100,000 with equipment. Application for permission has been made to Federal Alcohol Control Administration.

Common Council, Mamou, La., has called special election on Feb. 20 to vote bonds for $55,000 for new municipal gas plant and system.

Cuban-American Distilleries, Inc., 100 Poydras Street, New Orleans, plans new two and three-story plant at Louisiana and Chartes Streets, with one-story storage and distributing unit. Cost about $125,000 with equipment.

Town Council, Sardis, Miss., plans installation of Diesel engine-generating unit and auxiliary equipment for waterworks station. Federal financing is being arranged. A. B. Friend, Sardis, is engineer.

Common Council, Mandeville, La., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for water system. Fund of $82,000 is being arranged. Pugh & Gidiere, New Orleans, are engineers.

SOUTHWEST

City Council, Kahoka, Mo., asks bids until Feb. 28 for equipment for municipal water system, including elevated steel tank, 75,000 gal. capacity, on 125-ft. tower; steel settling tank, chemical dry feed machinery, coke tray aerator and accessories. Frank Beard is engineer.

Southeast Missouri Cotton Compress Co., Caruthersville, Mo., plans rebuilding part of plant recently destroyed by fire. Loss over $100,000 with machinery.

City Council, Burlington, Kan., has arranged additional Federal loan of $24,000, making total of $145,000 available for new municipal electric light and power plant and distribution system. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Altus Tractor & Implement Co., Inc., Altus, Okla., has been organized by E. S. Shelley, Altus, and J. H. Harlan, Enid, Okla., to manufacture tractors, parts, agricultural implements, etc.

Common Council, Burr, Oak, Kan., is arranging Federal financing for $47,500 through Federal aid for new municipal electric light and power plant, using Diesel engine-generating unit. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

San Antonio Refining Co., San Antonio, Tex., has approved plans for new oil refinery near city, and will soon begin work. Cost close to $100,000 with equipment.

Lone Star Gas Co., Dallas, Tex., plans six new gasoline refining plants in Texas Panhandle district, with air compressor stations, pipe lines, storage and distributing units and other structures. Cost close to $1,000,000 with machinery. New plants will be operated by Lone Star Gasoline Co., an affiliated interest. Frank L. Chase is manager of last noted company.

Common Council, Stamford, Tex., plans installation of pumping machinery and auxiliary equipment, pipe lines, fittings, etc., for new municipal water system. Fund of $155,000 has been arranged through Federal aid.

Honey Creek Distilling Co., South West City, Mo., J. W. Leonard, head, plans extensions and improvements, including additional equipment. Two-story and basement storage and distributing building will be built, 60 x 150 ft. Cost about $60,000 with equipment. Mid-West Engineering Co., 3504 Troost Avenue, Kansas City, Mo., is engineer.

Adolph Busch, Inc., St. Louis, has increased its capital stock from $10,000 to $1,000,000, and plans erection of a brewery at Broadway and Catalan Streets.

Spradling Auto Top Co., Inc., T. W. Spradling, president, has moved its factory from Kentucky to 3860 Laclede Avenue, St. Louis, where it has leased 32,000 sq. ft. of floor space. Company plans eventually to install $100,000 worth of new machinery.

WASHINGTON DISTRICT

Elkforge Distillery Corpn., Elk Mills, Md., is planning new multi-unit plant. Cost over $100,000 with equipment. Application has been made to Federal Alcohol Control Administration for permission.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 16 for pumping machinery, insulated cable, steam pressure gages, floor plates, electric switches, safety hand lamps, iron or steel pipe, cable clips, etc. (Schedule 2938).

Celanese Corpn. of America, Inc., Amcelle, near Cumberland, Md., manufacturer of cellulose rayon products, will soon begin superstructure for addition to Mill No. 3. Cost over $400,000 with equipment. Headquarters are at 180 Madison Avenue, New York.

Board of Public Works, Cumberland, Md., plans installation of pumping machinery and auxiliary equipment for additions in sewage system. Fund of $300,000 has been secured through Federal aid. Gannett, Seelye & Fleming, Inc., Harrisburg, Pa., is consulting engineer.

Taft Airplane & Mfg. Co., Baltimore, has been organized by Philip E. Taft and Edward T. Miller, 38 South Street, to manufacture aircraft and parts.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 13 for 181 chain hoists (Schedule 1634), clamps and punches (Schedule 1652), countersinks and reamers (Schedule 1653), calipers, dividers, gages, planes, etc. (Schedule 1654), files and rasps (Schedule 1642), wood-boring bits, chisels, knives, etc. (Schedule 1629), carbon and high speed twist drills (Schedule 1546) for Eastern and Western Navy yards; 76,500 lb. admiralty metal condenser tubes for Norfolk yard, 87,900

IN TERMS OF SERVICE

SATISFACTORY Perforated Metal is not just so many pounds of sheet or plate with holes in it. You buy it to do a specific job and should measure the cost by length and degree of service. You have the right to expect and to receive engineering service as well as poundage. With Wickwire Spencer Perforated Metals you get—first, an engineering service to assist in choosing the right specifications for the job to be done; and second, prompt delivery of a perforated product that fulfills your every requirement—however exacting. Our complete production facilities and engineers are at your service. Call on them!

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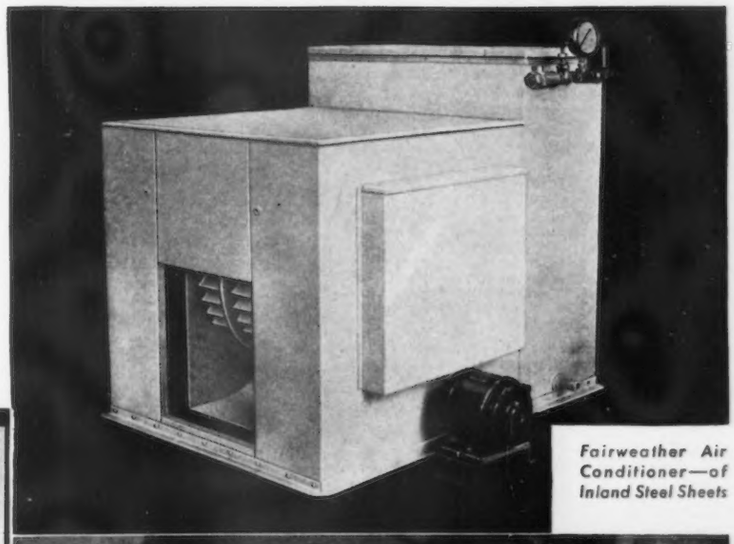
Some Inland Sheet Will Answer Every Problem



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Part of 1500 tons of Inland Steel Sheets in new Chicago Post Office

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To the manufacturer or installer of heating, ventilating, or air-conditioning equipment, Inland offers a complete steel sheet service. Some Inland Steel Sheet will meet exactly each of the many diverse conditions.

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ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Tin Plate
Plates Structurals Piling
Rails Track Accessories
Bars Rivets Billets

lb. and 41,400 lb. similar tubing for Mare Island and Puget Sound yards respectively (Schedule 1628).

WESTERN PENNA.

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, has plans for new three-story and basement automobile factory branch, 120 x 190 ft., with parts, service and repair departments, at Baum Boulevard and Roup Street, Pittsburgh. Cost over $300,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

City Council, Clarksburg, W. Va., plans installation of pumping machinery and auxiliary equipment, pipe lines, fittings, etc., for new sewage disposal works and system. Fund of $1,400,000 is being arranged through Federal aid.

Board of Allegheny County Commissioners, County Building, Pittsburgh, plans extensions and improvements in electric, gas, steam, water and other utilities at institutional buildings at Woodville, Pa., including pipe lines, etc. Cost $338,500. Federal financing is being arranged. J. L. Hopp, 508 Third Avenue, Pittsburgh, is engineer.

Allegheny River Mining Co., Kittanning, Pa., has approved plans for new all-steel tipple at Chickasaw coal-mining properties, about 30 miles from city. Work will be carried out by day labor. Cost about $85,000 with equipment.

MICHIGAN DISTRICT

Board of Public Works, Holland, Mich., has plans for new one-story equipment storage and distribution building. Cost about $57,000 with equipment. Don Lakie, Grand Rapids, Mich., is architect.

Upton Machine Co., St. Joseph, Mich., affiliated with Nineteen Hundred Corpn., Binghamton, N. Y., manufacturer of electric washing machines, parts, etc., is planning expansion in output and will arrange facilities for production of a number of specialties now manufactured at Binghamton works for central states business.

Bates Ludington Co., Ludington, Mich., has been organized by R. E. Bates, Ludington, and associates, to manufacture automotive equipment, parts, etc. Company will take over and expand local organization of similar name.

City Council, Niles, Mich., is considering new municipal electric light and power plant. Cost $327,000 with equipment. Federal financing will be arranged. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Holly Hills Distillery, Holly, Mich., recently organized by Edward A. Gorney, an official of Flint Hills Brewery, and associates, has acquired former local works of H. J. Heinz Co., on 10-acre tract, and will remodel for distillery. New buildings will be erected. Entire project will cost over $150,000 with machinery.

OHIO AND INDIANA

Ridge Tool Co., Ridgeville, near Elyria, Ohio, manufacturer of pipe wrenches, pipe dies, etc., has begun erection of one-story addition. Equipment will be installed to double present capacity. William Thews is superintendent in charge.

Henderson Tire & Rubber Co., Bucyrus, Ohio, recently organized, has taken over local factory and will remodel for new plant for production of automobile tires, tubes and other rubber specialties. Financing for $50,000 has been arranged.

Village Council, Greenfield, Ohio, plans extensions and improvements in municipal electric light and power plant, and waterworks. Cost about $75,000 with equipment. Financing is being arranged through Federal aid. W. I. Barrows, Reibold Building, Dayton, Ohio, is consulting engineer.

Chrome Metal Products, Inc., Cleveland, care of Chamberlin & Chamberlin, East Ohio Gas Building, has been organized by Charles E. Bell and associates, to manufacture metal goods.

Chaney Mfg. Co., Springfield, Ohio, manufacturer of thermometers and other instruments, plans rebuilding part of storage and distributing plant, recently destroyed by fire. Loss about $45,000 with equipment.

Great Lakes Distilleries Co., Guarantee Title Building, Cleveland, F. H. Eggers, president, recently organized, has plans by John H. Graham & Co., Hanna Building, architects, for remodeling two three-story industrial buildings at 5201 Dennison Avenue, for new plant. New units will also be built. Cost about $350,000 with equipment. H. J. Hassler, Hanna Building, is engineer.

Treasury Department, Washington, James A. Wetmore, supervising architect, has revised plans for two new one-story shop buildings, 62 x 168 ft., at United States Industrial Reformatory, Chillicothe, Ohio, and will soon take bids on general contract.

India Tire Co., Akron, Ohio, is being organized to take over India Tire & Rubber Co., manufacturer of automobile tires and tubes, now in receivership. New company will carry out increased production. W. G. Klauss, president of former company, will act in same capacity for new organization.

Big Four Railway, 105 South Meridian Street, Indianapolis, has let general contract to Walsh Construction Co., 19 South LaSalle Street, Chicago, for extensions and improvements in engine house at Indianapolis, with shop facilities. Cost about $50,000 with equipment.

Board of Sanitary Commissioners, City Hall, Indianapolis, plans installation of air compressors, tanks, sludge machinery, pipe lines and other equipment for new sewage disposal works. Fund of $395,000 has been secured through Federal aid. A. H. Moore, City Hall, is city engineer.

Nomis Oil Burner Corpn., 429 Lingle Avenue, Lafayette, Ind., has been organized by R. K. Roth and R. B. Kurtz, to manufacture oil burners and oil-burning equipment.

City Council, Goshen, Ind., plans installation of pumping machinery and auxiliary equipment, pipe lines, fittings, etc., for extensions and improvements in municipal waterworks Plant will be electrified. Charles Brossman, Chamber of Commerce Building, Indianapolis, is engineer. Fund of $150,000 has been secured through Federal aid.

Electric Auto-Lite Co., Toledo, Ohio, manufacturer of automobile lighting and starting equipment, etc., has arranged for merger with Motometer Gauge & Equipment Corpn., 405 Lexington Avenue, New York, manufacturer of automotive recording devices and equipment, with plants at LaCrosse, Wis., Toledo, and Hamilton, Ont. It is understood that consolidated company will be known as Autolite Motometer Co. Plant facilities will be combined for certain divisions of production and expansion carried out.

PACIFIC COAST

Three G Distillery, Burbank, Cal., care of Arlos R. Sedgley, 910 North Serrano Avenue, Los Angeles, architect, has plans for new works at Burbank, consisting of main distillery, 50 x 110 ft., and smaller units. Cost about $50,000 with equipment. Later company will build a malt plant and storage and distributing building. Daniel Greenburg, 5335 Melrose Avenue, Los Angeles, is one of heads of company.

City Council, Modesto, Cal., has plans for one-story municipal machine shop, 42 x 90 ft. F. J. Rossi is city engineer, in charge.

Common Council, Parowan, Utah, is planning extensions and improvements in municipal electric light and power plant, including additional equipment. Improvements will also be made in waterworks, with installation of pumping machinery and accessories. Fund of $70,000 is being arranged through Federal aid. Caldwell & Richards are consulting engineers.

Long Beach City High School District, Long Beach, Cal., plans manual training department in new one-story David Starr Jordan High School. Cost $130,000. Financing is being arranged. Martin C. Parker, 1070 East Broadway, is architect.

Stockton Port District, Stockton, Cal., plans new cotton compress, storage and distributing building on waterfront. Fund of $216,999 has been secured through Federal aid. Presses, conveyors, elevating machinery and other equipment will be installed. B. C. Allen is engineer for District.

Riverbank Canning Co., Riverbank, Cal., is planning new one-story canning plant, 100 x 200 ft., one-story winery, 100 x 200 ft., and distilling plant on 10-acre tract near municipal docks, Stockton, Cal. Entire project will cost about $250,000 with equipment. J. A. Allen, 22 South Sutter Street, Stockton, is architect. Lorenzo Zorillo is head.

Golden Age Breweries, Inc., Spokane, Wash., operating at former local Schade Brewery, 302 North Sheridan Street, has let general contract to F. E. Martin, Galax Hotel, for extensions and improvements. New equipment will be installed. Erection of a multi-story unit is planned later. Cost about $100,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 13 for corrosion-resisting bar steel (Schedule 1631) for Mare Island Navy Yard.

FOREIGN

Mexican Eagle Oil Co., Mexico, D. F., has secured Government concession for oil properties in State of Vera Cruz, about 24,000 acres, and plans early development, with installation of oil well equipment, pumping machinery, steel tanks, etc. A pipe line is under consideration across Isthmus of Tehuantepec. Entire project will cost over $250,000.

State Department of Public Works, Government of Poland, Warsaw, is planning electrification of railroad from Cracow to Zakopane, and similar electrification of line from Cracow to Katowice and vicinity, including main feeder and power distributing lines, substations, switching stations, and other facilities. Cost over $350,000.

Ministry of Industry, State of Mysore, India, plans hydroelectric generating plant and irrigation project on Bhadra River, with initial capacity of 9000 hp. Development will be known as Lakavalli Reservoir Project, and will include transmission lines, substations and switching stations, with electric-operated pumping plants for irrigation service. Cost 50,000,000 rupees (about $18,250,000).

Prof. Sprague Discusses Price Levels

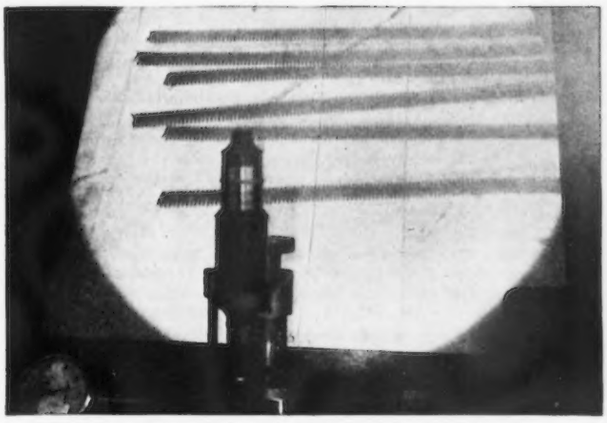
(*Concluded from Page* 17)

distrust, and it does not induce an active demand for additional credit and additional currency. It is an infernally complicated problem this, of trying to get prices up in a period of depression and it is absolutely hopeless to try to do it by monetary means alone. It requires much painstaking effort, both on the part of the business community and on the part of the government.

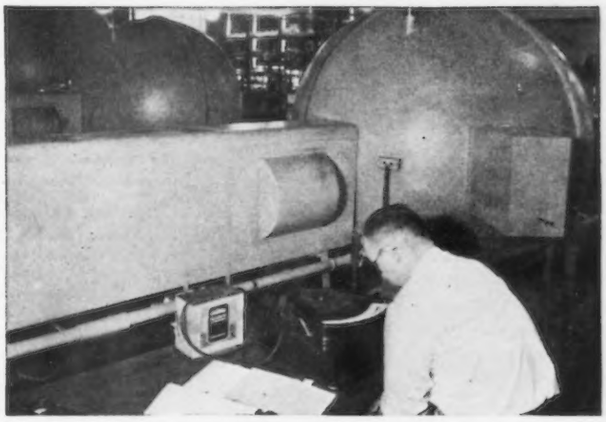
It does not mean that some emergency measures are not appropriate; such as special relief measures for agriculture, always assuming that those relief measures are so devised as not to bring about an increase in the production of those agricultural commodities that are already in excess supply. If it is possible by government means to assist the farmer to get, during this period of trade recovery, a higher price relative to manufactured goods, for his product, it should be done because the farmer is so numerous that he is less able to protect himself than are industrialists.

But by and large, the main effort, the business constructive effort should be directed toward creating a situation in which something or other can be produced at a profit in larger quantities than in the past, so that more labor and material will be employed, with a consequent possibility of an upward movement in prices. We should look far more hopefully to the business community for efforts in this direction than from any government whatever, for it is here a little and there a little that enterprising business men can perceive markets and the possibilities of markets, whereas government officials can only see things in the large as, for example that Bureau of Labor Index.

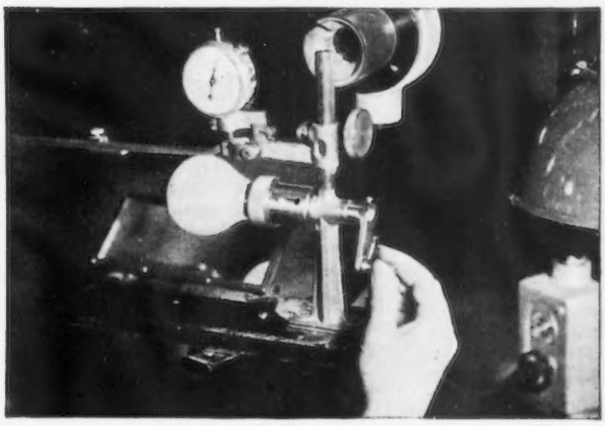
4 *out of* 480
steps to good light at low cost



1. *Finer than a hair,* G-E MAZDA lamp filaments are magnified 75 times for accurate inspection.



2. *A yardstick for light.* This spherical photometer tells whether a lamp gives all the light it should.



3. Catches crooks! One turn of this guage exposes crooked bases. But 999 out of 1000 "go straight".

4. No! Not milk! but sand pulverized from specially quarried rock to make the flawless glass for G-E bulbs.

THESE are some of the checks that insure the quality of General Electric MAZDA lamps. What does this quality mean to you? It means that General Electric MAZDA lamps give the maximum amount of light for the current they use . . . do not blacken quickly nor burn out prematurely. To get good light at low cost, you should make sure that the G-E monogram is on the end of every lamp you buy. General Electric Company, Nela Park, Cleveland, Ohio.

GENERAL ELECTRIC
MAZDA LAMPS

Gray Iron Structure Without Chill Obtained in Centrifugally Cast Pipe

(*Concluded from Page 29*)

For furnishing the iron two 108-in. cupolas, originally used for pit cast operation, have been rebuilt and provided with a forehearth, the same as at the Burlington and Birmingham units, to condition the iron better for the purpose intended. After the iron is drawn from the forehearth, it passes directly into the pouring ladles. These ladles are conveyed to the respective machines by means of an overhead traveling crane. The runway of this crane was an added piece of construction in the remodeling of the shop, it being necessary to support the runway from hangers from the center of the building trusses as indicated in the drawing. This crane spans half the width of the building, the other half being spanned by a similar crane. This latter crane is used to take the freshly cast pipe from the machines to the charging end of the annealing furnace.

The sockets for the bell end of the pipe are made of sand. A socket core plant is located at the end of the unit and includes ovens, sand handling equipment, blacking tables, etc. The sockets after being rammed at the tables and blackened are placed upon trays, which are carried by an electric lift truck to the baking ovens. The dried sockets are delivered on the trays to the casting machines ready for use.

The annealing furnace is located in close proximity to the casting machines. A weighing scale is installed directly in front of it. The furnace is operated with gas as fuel under automatic control of thermo-couples to limit the variation in temperature to 20 deg. F. After annealing, the pipes pass through the various operations of cleaning, coating and testing, and there is a final weighing as the pipes reach the storage yard where immediate shipment can be made, if necessary.

The annealing furnace and core ovens were constructed by the R. & S. Products Co., Philadelphia. The structural steel work in connection with the improvement was erected by the Virginia Bridge & Iron Works. "Usicast" cast-iron roof plates, a new product of the United States Pipe & Foundry Co., have been used in roofing the new unit. The design of the entire unit and the general supervision of construction were accomplished by the engineering department of the company.

TRADE PUBLICATIONS

Steel Shelving.—Universal Fixture Corpn., New York. An attractive folder showing improved rigid skeleton and stock shelving, and steel cabinets with various types of doors. The parts are of the interlocking type and require no bolts or nuts.

Zinc Die Castings.—New Jersey Zinc Co., New York. Eighth edition of the "Zinc Alloy Pot," illustrating the adaptability of die castings to small automobile parts, toys, home accessories, and novelties. Particular attention is paid to highly finished merchandise containers which may be used for cigarette containers.

Efficient Shipping Cartons.—Acme Steel Co., Chicago. A new set of literature giving efficiencies and economies effected in new methods of preparing boxes and loads for shipment. Especial attention is paid to methods of strapping cartons, making small package bundles, and making a unit load of a great number of pieces of tubing or rod.

Condensation Equipment.—Mason Mfg. Co., New York. Illustrated catalog presenting various types of vacuum, combination, and separating traps, Detroit receivers, gages, cocks, quick-opening valves, feeders, glue heaters, etc.

Welding Wire.—Williams & Co., Inc., Pittsburgh. A new price schedule giving in condensed form the prices on all brands of welding wire which are of general interest.

Air Preheating.—Air Preheater Corpn., New York. Large folder illustrating the various applications of the Ljungström air preheater. The information is of particular interest to managers of utility and industrial steam power plants and to those interested in heat recovery.

Removal of Condensate. — Coe Mfg. Co., Painesville, Ohio. Illustrated folder presenting the improved Coe Drainator for removing condensate from steam condensing devices, kettles, presses, heating and processing machines, etc.

Flexible Shaft Couplings.—Poole Foundry & Machine Co., Baltimore, Md. Large illustrated booklet giving complete engineering data for improved Poole couplings which are self-aligning, have high strength, and have no springs, bushings, or pins.

Stainless Steel Characteristics. — American Rolling Mill Co., Middletown, Ohio. Attractive brochure showing various applications and physical characteristics of different grades of stainless steels. Pays particular attention to the value of various steels to specific applications.

Quarter-Turn Valves. — Homestead Valve Mfg. Co., Coraopolis, Pa. Pocket size catalog describing various valve principles. Different hookups for fluids, gases, and vapors are clearly shown.

Portable Furnaces.—Sullivan Machinery Co., Chicago. Illustrated bulletin showing the construction and various applications of fully portable furnaces which can be fired with any grade of oil. They find particular use as efficient and dependable drill steel heating units.

Stainless Steel for Decoration. — Republic Steel Corpn., Youngstown, Ohio. Excellent illustrated brochure containing a large fund of comprehensive information on architectural and decorative applications of Enduro stainless steel. Includes fabrication technique, properties, shapes, and finishes available.

Beam Steel Floors.—H. H. Robertson Co., Pittsburgh. Booklet demonstrating the improved Robertson Keystone Beam Steel Floor which is particularly adaptable to use in low-cost housing and building construction.

Diesel Engines.—Busch-Sulzer Brothers, St. Louis. A large booket showing applications and engineering data of stationary and marine types of engines of large horsepower. The descriptions include the world's largest locomotive and the world's largest trunk piston Diesels.

Stainless Steels for Containers.—American Sheet & Tin Plate Co., Pittsburgh. Large booklet describing fabricating and corrosion data of various standard grades of stainless steels. The work is of great interest to makers of dairy and milk plant equipment.

Seam Welders. — Thomson-Gibb Electric Welding Co., Lynn, Mass. Bulletin describing an improved electric seam welder especially designed for joining uniformly straight or circular standard units.

Split-Phase Motors.—Emerson Electric Mfg. Co., New York. Folder presenting descriptions and operating data of various types of motors with different speeds and fraction horsepowers.

Graphic Recording. — Esterline-Angus Co., Indianapolis, Ind. Folder describing advantages and uses of recording instruments to control and check all kinds of industrial operations of a repeating nature.

Conveyor Electric Furnaces.—W. S. Rockwell Co., New York. Bulletin showing characteristics and uses of continuous conveyor electric furnaces for hardening or tempering moderate-sized tools or pieces of metal.

Industrial Hoists. — Harnischfeger Corpn., Milwaukee, Wis. Bulletin in color showing installations, diagrams, and operating data for all types of hoists for industrial plants and shops.

Triangle Drills.—Rawlplug Co., Inc., New York. Folder describing a new triangular pointed drill which is claimed to be superior to the four-pointed drill for hand drilling of masonry.

Steel Surface Finishing.—Parker Rust-Proof Co., Detroit. Folder summarizing the uses and advantages of rust-proofing and finish improvement of all kinds of iron and steel products.

Arc Welding Equipment.—Universal Power Corpn., Cleveland. Bulletin presenting complete line of shunt inductor welder motor-generator sets, accessories, and clothing for arc welders.

Feed Water Regulation.—Northern Equipment Co., Erie, Pa. Bulletin illustrating and describing the Copes double control regulator, which feeds boilers according to rate of steam flow and corrects for water level changes.

Furnace Refractories.—McLeod & Henry Co., Troy, N. Y. Illustrated bulletin presenting a super-refractory of exceptional smoothness and capable of withstanding destructive influences of high furnace heat and hard physical punishment. The non-clinkering qualities make the material particularly suitable for use in the clinker zone of water gas generators.

JUST BETWEEN US TWO

Now We Can Tell All

IN our bashful way we hinted to a certain manufacturer, who is casting sheep's-eyes at the Russian market, that we might help. "How?," sezzee. "Look," sez we, reeling off a list of Iron Age subscribers in the U.S.S.R.

He gasped, and whispered in an awed tone, "Who are they?" Quick as a flash, we mumbled, "Why, er—er—here's er—the Filial Narkomtjashproma, the Gironiimstaljmost, the Komitet Po Isobretateljstwu, and the Inst. Mir. Chos. i Mir. Politiki, the Lesobummaschina, Kolom. Machinostr. Sawod, the Awiazino—"

"Again I ask, who are they?," he interrupted, cutting short our recitation of one thousand ways of mispronouncing simple Russian words. "What do those names mean in English?" At the time all we knew about Russia was what we learned from the "Volga Boat Song," so we just gave up.

"When you find out whom you really reach in the U.S.S.R.," he continued, "come up and see muh some time." Forthwith we hied ourselves to the U.S.S.R.'s American offices and now we know all. It seems we cover the Russian metal-working industry like a seine covers a school of salmon.

Magnitogorsk, Swerdlowsk, Kuznetsky, Tula, Taganrog, Charkow, Nikopoljsk, Gorkowskowski Kraj, Dnepropetwosk, Mariupolj, Nishnij-Tagil, Donezk, Ketschj, Cheliabinsk, Lipezk Ztscho, Noginsk, Konstantinowka Donbass, Golutwin, Sastafoni Georgien, N. Novgorod, Moscow and the other industrial centers, making automobiles, machinery, tractors, locomotives, pipe, railroad cars, steel, agricultural implements, etc., all get their weekly copies of the metal-workers' family journal.

The supervisory organizations that control individual plants or groups of plants also receive The Iron Age. A few examples: Commission of Heavy Industries, Commission of Forging and Stamping Industries, Snarjardnomu Trestu (Equipment Trust to you), Commission for Machine-building Projects, Bureau of Heavy Machinery Construction, and so on and on.

You will be greeted as a tovarisch (buddy, pal, old potato) if you mention that you read The Iron Age when you call at the Ural Polytechnical Institute, the Welding Institute, the Machinery Construction Institute at Kiev, the Engineering and Economic Institute in Moscow, the Siberian School of Mines, the Metal-Working Academy in Moscow, the Institute of Industrial Experimentation, or almost any other of Russia's technical schools or institutes interested in metals or metal-working.

If you make something you don't want Russia to know about keep it out of Iron Age.

More Than Skin Deep

LIKE many another, we are far more critical of adverse criticism than we are of praise. On those infrequent occasions when someone suggests we are less than perfect, we hastily throw up a breastworks of defense. *Who is this person? Is he qualified to criticise? The chances are he is just an old meany. Maybe he was crossed in love.* And so on.

But not so with encomiums. We take 'em as is. Here, we say, is a gentleman of refinement and discernment. But once in a while one gets under our skin. For example, this one from a little manufacturer of garden tools down in Texas:

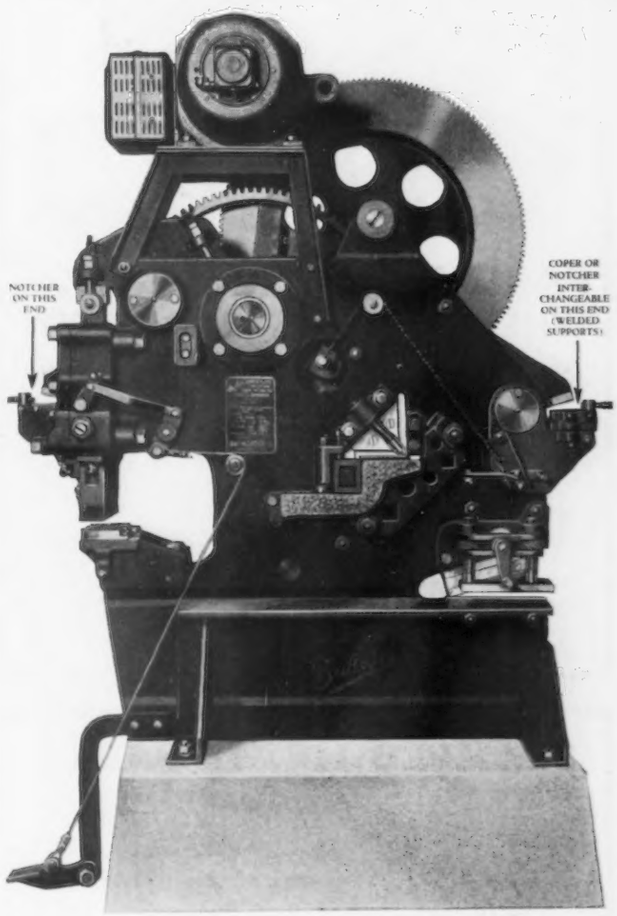
> *"I enclose money order for $1.50 on my subscription for another year. Will remit balance as early as possible. Money is so scarce and hard to get that I have to divide it up as I do not have enough to pay all accounts in full.*
>
> *"Hope this will not inconvenience you. I need The Iron Age even if my business is small. Iron Age helps make a small business big."*

Profits Go Up In Smoke

IN Barron's, the financial paper, W. W. Hay declares there is a direct and definite connection between cigarette advertising and earnings. He urges investors who like tobacco stocks to base their judgment more on display ads than on cigarette production statistics. "For," as he says, "if we have learned anything from the behavior of consumers it is that *advertised goods of known and certain quality . . . sell in larger volume than unadvertised brands of whatever quality.*"

That's a powerful statement. Maybe it's true. We wouldn't know for sure. But we do know that in almost any line the live ones are usually the advertisers. Seems to us those who prefer to blush unseen are poor bets. A. H. D.

Cutting Costs *Cut* ~ ~ ~ ~



Where a Buffalo Universal Iron Worker is put on the job you'll see cutting and punching costs slashed to a minimum. Shearing rounds, squares, flats, tees, beams, channels, plates —in fact, practically any section—Universals are equally adept at rapid punching, notching, or coping, without change of tools, or adjustments. All Buffalo Iron Workers have electrically welded "Armor-Plate" steel frames, much lighter and stronger than cast iron, working parts of heavy duty steel —heavy bronze bearings with all wearing parts arranged for forced lubrication.

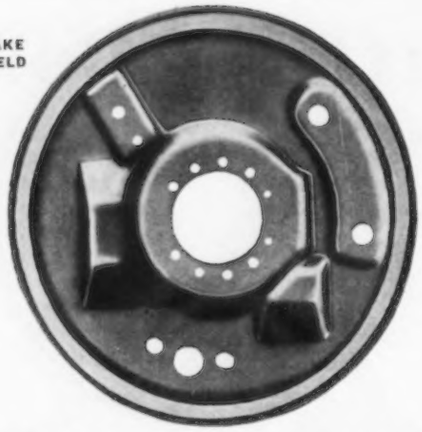
Buffalo Universal Iron Workers are built in several sizes— from the No. ½ shown here to huge machines which make a single bite of 6 to 8" stock.

All Buffalo Iron Worker frames are guaranteed unconditionally forever against breakage. Before you purchase any metal cutting or punching machine ask for our binder which describes the entire line of Universals, Bar Cutters and Bending Rolls.

BUFFALO FORGE COMPANY
492 Broadway, Buffalo, N. Y.
In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" **ARMOR PLATE UNIVERSAL IRON WORKERS**

BRAKE SHIELD



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F. Somers Peterson Co., 57 California St., San Francisco, Cal.

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Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Wood, R. D., & Co., Philadelphia.

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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

ACID-PROOF COATING
Cellcote Co., The, Cleveland.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Grasselli Chemical Co., Inc., Cleveland.

AIR TANKS AND CYLINDERS
Scaife, William B., & Sons Co., Ptgh.

ALLOYS—Calcium-Silicon
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium
Dow Chemical Co., Midland, Mich.

ALLOYS—Phosphor Bronze
Phosphor Bronze Smelting Co., Philadelphia.

ALLOYS—Silico-Manganese
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Titanium
Metal & Thermit Corp., 120 B'way, N. Y. C.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

ALLOYS—Tungsten
Vanadium Corp. of America, 120 Broadway, N. Y. C.

ALLOYS—Vanadium
Vanadium Corp. of America, 120 Broadway, N. Y. C.

ALLOYS—Zinc Base Die Casting
New Jersey Zinc Co., Inc., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.
British Aluminium Co., Ltd., 122 E. 42nd St., N. Y. C.

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Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Manealoff & Co., Inc., 19 Rector St., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., Midland, Mich.

ANNEALING—See Heat Treating

ANODES—All Types
Udylite Process Co., Detroit.

ANODES—Cadmium
Udylite Process Co., Detroit.

ARBORS
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., Chi.

AUCTIONEERS
Anthony, Henry S., & Co., Lowell, Mass.

AXLES—Car or Locomotive
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.

BALLS—Steel, Brass or Bronze
Auburn Ball Bearing Co., 63 Clarissa St., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Bethlehem (Pa.) Steel Company.
Inland Steel Co., Chicago.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Globe Mch. & Stpg. Co., Cleveland.

BARRELS—Tumbling
Baird Mch. Co., Bridgeport, Conn.
Globe Mch. & Stpg. Co., Cleveland.

BARS—Alloy
Allegheny Steel Co., Brackenridge, Pa.
Republic Steel Corp., Youngstown, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass & Bronze
Johnson Bronze Co., New Castle, Pa.

BARS—Cold Drawn
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.

BARS—Magnesium Alloys
Dow Chemical Co., Midland, Mich.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Joseph T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

BASES—Column, Machinery
Lukens Steel Co., Coatesville, Pa.

BATTERIES—Storage
Electric Storage Battery Co., Phila.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Bunting Brass & Bronze Co., Toledo, O.
Cramp Brass & Iron Foundries Co., Phila.
Johnson Bronze Co., New Castle, Pa.

BEARINGS—Ball
Auburn Ball Bearing Co., 63 Clarissa St., Rochester, N. Y.
Bantam Ball Bearing Co., South Bend, Ind.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Brass and Bronze
Bunting Brass & Bronze Co., Toledo, O.
Cramp Brass & Iron Foundries Co., Phila.
Johnson Bronze Co., New Castle, Pa.

BEARINGS—Laminated, Non-Metallic
Synthane Corp., Oaks, Pa.

BEARINGS—Oilless
Rhoades, R. W. Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Quill Roller
Bantam Ball Bearing Co., South Bend, Ind.

BEARINGS—Radial
Bantam Ball Bearing Co., South Bend, Ind.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BEARINGS—Roller
Bantam Ball Bearing Co., South Bend, Ind.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., Canton, O.

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